

THE TEACHER'S HANDBOOK
OF
TECHNICAL VOCABULARY

BY
LUELLA COLE

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THE TEACHER'S HANDBOOK OF TECHNICAL VOCABULARY

By
LUELLA COLE
Berkeley, California



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CHAPTER I

THE IMPORTANCE OF CONCEPTS FOR MASTERY OF CONTENT

Some teachers seem to have the naive idea that "words" are of little significance, and that only "ideas" are important. However, a list of the essential *words* in a subject is substantially a list of the outstanding *elementary ideas* which must be mastered for the understanding of subject matter. Most students who fail are not hopelessly stupid; they have simply not acquired the basic concepts. The initial miles of the road to learning are paved with specific, individual concepts—not with generalities. These latter have their place, naturally, but not at the beginning of a subject. A pupil can neither appreciate nor react to ideas that he does not comprehend.

The writer would like to suggest to teachers that they use the lists of terms presented later as nuclei around which to organize their teaching. That is, in taking up a new topic, the teacher should be sure to teach the necessary concepts as she proceeds with her explanation of the subject-matter. She can use tests from time to time to check on each pupil's mastery of these essentials. Once she has achieved a comprehension of these elementary concepts she may continue, with a reasonable assurance of being understood, to a discussion of the "main ideas" which she quite rightly regards as the flower of her teaching effort. There is no idea of abandoning general principles permanently in favor of details. What research makes clear is that main ideas are developed by the mastery of details—not by the avoidance of them. If a teacher wishes to bring about comprehension and appreciation, there is no quicker way than to insist upon a clear grasp of the elementary concepts upon which the general attitudes must rest.

The essential technical words are thus to be regarded as the "thought elements" of a subject. They are, therefore, not "mere words" but the *sine qua non* of that complicated reaction known as thinking. If teachers will recognize this psychological relationship, they will be able to improve to a considerable degree the ability of their students to think, because they will have furnished their pupils with the raw materials by means of which thinking is done—and without which thinking is, if not impossible, certainly clumsy and inaccurate.

CHAPTER II

IMPORTANT INVESTIGATIONS OF ESSENTIAL VOCABULARY

During the last twenty years, attention has been focused upon the determination of prime essentials in the elementary and high school subjects. As one evidence of this tendency, much research into essential vocabulary has appeared. Most investigations in this field have terminated in one or more lists of "special" or "technical" terms. These lists have usually been long and unwieldy. They have often appeared in so unassimilated and unorganized a form as to be useful mainly for research purposes. Although there is great value in these wearisome lists of specific terms, relatively little help has yet been derived from them by the average teacher. It, therefore, seemed desirable that someone should study the thousands of technical terms already listed, weigh all available evidence, organize the mass of minutiae into some coherent pattern, and produce a summary fitted to the needs of the consumer. The present manual is the result of such an effort to reduce the substance of the many valuable studies to a usable, practical form.

Procedure Used in Determining Technical Vocabulary

The first step was, obviously, to make a brief summary of the relevant research. It is not necessary to describe the exact method used by each investigator—although references will be given for each study mentioned, and the reader who is interested in details may look up the indicated articles. It is, however, important to give a general account of how the essential technical words in a subject are found, since this information is needed as a background for proper interpretation of the vocabulary lists to be presented later. A single description, with minor variations, will hold for the separate studies. There are, in general, three steps in determining the essential terms in any given school subject. These steps will be outlined in order.

(a) The usual first step has been to make a "frequency count" of the special words used in textbooks in the subject under consideration. Sometimes every word in the textbook is listed, regardless of whether or not it is technical. But more often only those words which might be considered special to the subject are selected, the "frequency" of each such word being determined by tabulating its recurrences

throughout the book. There are, of course, variations in judgment as to what is technical and what is not. Investigators, therefore, use several different persons to do the reading and several different textbooks. This reading and tabulating of special words is continued until new terms cease to appear. The actual number of books used to reach this saturation point has varied from five to twenty-five, depending upon the size and compactness of the vocabulary under investigation. The resulting list of terms, each one followed by a number indicating how many times it appeared in the texts read, shows what technical words there are and how often each appears in the books analyzed. Other materials than texts have sometimes been used. Courses of study and current magazines have occasionally been analyzed in similar fashion. The main studies, however, are limited to analysis of the technical "load" of the most widely-used texts for the subject in the grades being considered by the investigator.

(b) This "frequency list" does not, of course, tell one immediately what is important, although frequency and importance are naturally correlated. There must next be a consideration of importance by itself. The investigator gives his list of terms, with or without the accompanying frequencies, to as large a group as he can obtain of "expert teachers" in the subject and asks these experts to rate each term as to its importance in teaching. He may, for instance, have each expert mark with a number "1" those words that seem to him absolutely essential, with a number "2," those that seem to him important but not essential, or with a number "3" those that he thinks of little or no value for teaching purposes. Such ratings, when summarized so as to take account of the various weightings, offer a criterion of importance.

(c) The investigator also tries, although often in a somewhat unsystematic fashion, to estimate the social usefulness of each term—that is, its value in life outside the classroom. For instance, the word "addend" appears in many elementary school arithmetics and is occasionally rated as important for teaching; it has, however, a low "social" value, because it is a term one would almost never use outside the arithmetic class. On the other hand, such words as "premium," "interest," "fraction," or "subtract" are in constant use outside of school as well as in other than arithmetic classes in school; these words have, therefore, a high social value.

The investigator utilizes, then, *three criteria* concerning each of the terms discovered in the analyses of textbooks, courses of study, or current reading matter. He has (a) the criterion of frequency—the number of times each word appears; this figure is usually reduced

to the number of appearances per textbook. He has (b) the criterion of importance—the combined, weighted ratings of experts. He has (c) the criterion of social usefulness—a judgment that is not usually stated in an altogether objective way. This third estimate of a word's value is not applied, however, until after the list of terms has been boiled down by applications of the first two criteria.

With these ratings at hand, the investigator next goes over his entire list of terms; the total number ranges from about 500 to well over 2,000, depending upon the subject. He first discards those words with such low frequencies as to be insignificant. This one operation reduces the list to more manageable proportions, since at least 60 percent of the words occur only once or twice per text—and a term that appears not oftener than once in about 200 pages cannot be regarded as essential to the subject-matter. Such terms are, therefore, eliminated from further consideration. In the shortened list there are some words that the experts have rated as unnecessary; these are also discarded. These two procedures reduce the list 75 to 90 percent, depending upon the extensiveness and diffuseness of the field of knowledge under consideration. The remaining terms are then considered in the light of the social criterion, and a few further reductions are usually made. There remains a core of highly significant terms, which represent the essential concepts of the subject. These are the words that are of frequent use, of vital importance, and of general social value. The terms presented in the last part of the book have passed these three tests of essential significance.

This list of essential words or ideas is then studied further, so that the terms may be classified in some way—the groupings depending, of course, upon the subject. Thus, in arithmetic, the names of the operations constitute a natural group of terms; the names of the units of measurement, another group; the words needed in fractions, another; and so on. Such grouping of the terms does not result in any further eliminations but is of value in organizing the results of all previous steps into usable form.

A concrete example may make clearer the procedures above described in general terms. Thus, in one study (80) of technical vocabulary in American History, the first list totalled 1,444 different special terms that had been found on the pages of over twenty texts. The frequencies ran all the way from words that were found only once in the entire 9,000 pages (approximately) to a small number appearing over 400 times per book—or about eight times on every nine pages. The entire list was submitted to teachers of history, including several college professors, who indicated their judgment as to the value of each term for teaching. These ratings gave a wide range of values, varying

from some words rated as absolutely essential by every teacher to others judged by all to have no value. In this study, the third criterion—that of social usefulness—was applied, both subjectively and objectively. First, seven intelligent and highly-trained persons who were not teachers of history rated each term of the original 1,444 as to its usefulness outside the classroom. To obtain a more objective criterion, the technical vocabulary of front-page newspaper articles, editorials, and magazines reporting current events was analyzed. The list derived from these samples of everyday, non-academic reading matter was compared with the list from the texts. Some words, of which “state” is an example, appeared with high frequency in the texts, were rated as vitally important by all teachers, were judged as being valuable in daily life, and appeared on almost every page of the newspaper and magazines. Other terms, of which “colonial” is an example, had a fairly high frequency in the texts and a moderate rating by the teachers, but received little support by either subjective or objective criterion of social usefulness. While such words undoubtedly have some value, they cannot be regarded as absolutely fundamental and have, therefore, no place in a vocabulary designed to contain only the essential core of terms. Other words, of which “flibuster” is an example, showed a low frequency in the texts, a relatively high rating by teachers, and a very high rating for general value outside the classroom. Such words were included as basic, because of the probable usefulness in adult life, in spite of their lowly position in the texts. Every term of the entire 1,444 was carefully considered in the light of all available evidence. Only 328 words survived this searching examination of value. The “core,” as determined by this study, included approximately 23 percent of the original list.

This study is, in its main outlines, characteristic of all. Especially to be noted are: (a) the extensive preliminary investigation of frequency, (b) the participation of many people in the evaluation of the terms, and (c) the marked reduction from the original to the final list. In most subjects, this reduction is even greater. History and geography are the two most discursive subjects regularly studied by school children, and the basic vocabularies are correspondingly large. In all other cases the final vocabulary was not over 17 percent of the original list and was sometimes as small as 8 percent.

It is with the essential core of terms in thirteen school subjects that the remaining portions of this manual will deal. The first three subjects are mathematical—arithmetic, algebra, and geometry. Then come three that concern language and literature—English composition, foreign language, and American literature. The social sciences—geography and history—follow. Finally come five sciences—hygiene, general science, chemistry, physics, and biology. In all cases the lists contain only those terms without which the subject-matter cannot be understood.

Investigations Made in Each Field

No two subjects have received the same amount of investigation. The vocabulary load in a subject, its importance in the curriculum, and the number of people who happen to have been interested in it have all contributed to varying numbers of investigations per subject. In all cases, however, adequate work has been done for a reasonable determination of the essential concepts in the fields above listed. For the benefit of those interested in a more detailed description of research for any one subject, the studies made in each field have been summarized briefly.¹

Arithmetic—Early studies were made by Haley (43) and Pressey (77). More detailed work was done later by Brooks (7) (8) Remmers and Grant (87), Himebaugh (47), (48); Dale (22), (24), (26) and Swan (102). These investigators worked largely on the basis of frequency alone, but with some reference to teaching importance and general social value. One summary of such studies was made by Elam, (35), who listed 121 concepts of utmost importance in elementary school arithmetic. This list did not include words necessary in problem-solving; abbreviations and symbols were also omitted. Subsequent work by Dale in the field of business arithmetic (22) and a review of work by Brooks in the vocabulary of problem-solving, (7) plus an inclusion of frequently-appearing symbols and abbreviations have brought the list of essential words to a total of 244. Of this number, 53 deal with fundamental operations; 87 deal with measurement; 28 with symbols and abbreviations, 26 with everyday problems, and 50 with problems in business arithmetic. With the omission of the last group, the total for elementary school is 194—an average of one a week from the beginning of the second grade to the end of the sixth. The actual load is considerably less than that indicated since the list includes many pairs of closely related words—such as “add” and “addition,” “foot” and “feet,” “broad” and “breadth,” “weigh” and “weight,” and so on.

Algebra—First investigations in this field were made by Thrush (105), and Pressey (77). A later, and more complete, study was made by Narragon (69), (84) who went into detailed considerations of the frequency, importance, and social value of each term. The final list, based on all previous work, contains 116 essential concepts; of these, however, 60 are duplicates of words appearing on the arithmetic list. There are thus only 56 new terms. If a year is spent on this subject, the 56 new words would require a mastery of approximately 1.5 words per week.² The entire number of words was distributed by

¹ The work in general reading vocabulary has not been included here, although articles dealing with this matter have been included in the bibliography. For the best presentation of general vocabulary, the reader is referred to Thorndike, E. L., *The Teachers' Word Book of 20,000 Words Found Most Frequently and Widely in the General Reading of Children and Young People*, Bureau of Publications, Teachers College, New York City, 1931.

² A school year of 36 weeks has been assumed for all calculations. A longer or shorter year would, of course, alter the load per week.

topic as follows: 16 were needed for nomenclature, 6 for factoring, 16 for equations, 9 for roots and powers, and 6 for graph making; there were also 6 signs or symbols. The remaining words were borrowed from arithmetic.

Geometry.—An early study by Pressey (77) paved the way for a detailed investigation by Zook (114), whose work was patterned carefully upon that done by Narragon in Algebra. A total of 142 concepts emerged as essential from a combination of these studies. Of this total, 47 words dealt with the names of geometrical figures and their parts, and 21 with relationships between parts. Another 19 were needed in demonstrating theorems, while 31 were borrowed from arithmetic or algebra; there were also 24 symbols. Of the entire number, 50 were duplicates of words appearing on the arithmetic or algebra lists. The 92 new words require a rate of 2.5 per week, if they are to be acquired in a year's study.

The overlapping from one list to another must be considered in the determination of the total technical vocabulary necessary for a mastery of elementary and secondary school mathematics. Assuming that arithmetic precedes the other two subjects and that algebra precedes geometry, there is enough overlapping to reduce the apparent total of 502 words to 392. The number of years devoted to study of mathematics is either eight or nine (grades 2-8 and one or two years in high school). The average number of words per week is therefore only 1.4—a total well within the learning capacity of even second-grade children.

English Composition.—The first work in this field was done by Heinrich, (46), but the outstanding research was carried on by Johnson (50), who made a thorough analysis of 23 handbooks, workbooks, and grammars, of which 6 were widely used in elementary school, 10 in high-school, and 7 in college. This study was made with such thoroughness that further research seems unnecessary. The final list, compiled from Johnson's raw data, contains 125 words and 11 punctuation marks. Of this number only 56 are concerned with grammar. Twenty-two consist merely of the punctuation marks themselves and their names, while the remaining 58 are concerned with theme writing, letter writing, and word study. Assuming that mastery of these 136 terms and marks may be stretched out from the beginning of the fourth grade to the end of the twelfth, only 15 words need be learned per year.

Language.—First investigations were made by Heinrich (46) and Pressey (77). Subsequently, a thorough study was concluded by Pressey (82), who analyzed grammars in four foreign languages, Latin, German, French and Spanish.³ On the basis of these investigations, which have

³ There have also been extensive studies of the essential vocabulary in French (14), German (45) (68) and Spanish (10) (54) (53). As these investigations deal with general rather than technical vocabulary, they are not summarized here, although references to them are carried in the bibliography for the benefit of those who may be interested.

been very thorough, those concepts needed in the early stages of mastering a foreign language have been determined. Such a combining of several languages naturally eliminates any term peculiar to only one—such as “umlaut,” “cedilla,” or “ablative case.” However, practically all the essential terms in any one language were common to all four. The total number on this combined list was 96, of which 46 were duplicates of terms already appearing in the English composition list. In a year’s time the remaining 50 terms could be mastered if 3 terms were learned every two weeks. There is therefore enough time left for the addition of the further words necessary in any one language but not in the others.

American Literature.—In this field the chief studies are by Miller (66), Pressey (77), and Cole (18). Literature has an extensive vocabulary. The original list of nearly 2,000 terms was, therefore, imposing. However, after reduction by the application of the usual criteria, only 307 essential words were left, of which 25 were duplicates of words listed under English composition. Of the 307 words, 79 are names of different kinds of writing or of definite sections within literary compositions; 10 are concerned with types of author; 142 deal with characteristics or analysis of written work; 27 are concerned with figures of speech or word study; the remaining 49 are needed to describe historical developments. Since students study literature as a required subject for at least four years (and usually longer), a rate of two words a week is adequate for learning the 282 new terms of this list.

Again there is overlapping from one subject to another within the same field. The apparent total of 539 words is thus reduced to 468. Naturally, there is more overlapping between composition and foreign language than between either subject and literature.

Geography.—In this subject, four excellent fundamental lists, giving word frequencies, have appeared. Baxter (6), Gabler (41), the Bureau of Educational Research (113), and Pressey (83) have all made intensive studies. The entire number of different words listed by all this research was nearly three thousand. The really fundamental terms that finally emerged total only 352—about 12 percent of the original number. Of these, 63 are names of animals, plants, or raw products; 103 deal with economic and social life; 143 are terms used in describing physical features; the remaining 43 are concerned with the phenomena of weather conditions. In the entire list, there are 58 terms that are duplicates of words in the history vocabulary, 57 more that appear on one or more of the science lists, and 6 that come from arithmetic. With the exception of these last few, the terms are generally met for the first time in geography; only 6 may therefore be subtracted from this list as duplicates. Since the list is based upon texts used in both the lower grades and high school, it includes a few terms that are beyond the needs of the elementary-school child. To estimate the rate at which the words should be learned, one must assume a study beginning not later than the third grade and continuing through the sixth,

with one additional year in either junior high or high school. A mastery of two words a week is sufficient.

History.—Initial studies by Pressey (77) and Clucas (16) have been followed by more detailed investigations by Barr and Gifford (3) (4), Kelty (52), Brown (9), Pressey (77) (80), Stevenson and Ward (100), Ward (109) (110), and Stephenson (98) (99). A combination of these various studies yields a list containing over 3,000 different words.⁴ Intensive examination of each word reduced this rather staggering total to 431—a relatively long list when compared to the 116 for algebra, but still only 14 percent of the original number. Of the 431, there are 58 duplicates from the geography and 16 from the arithmetic list, leaving 357 new terms. The entire list is divided as follows: terms dealing with government, 153; with politics, 37; with economics, 54; with sociology, 38; with law or violations of law, 51; with religion, 11; with geography, 22; with military operations, 42; with time sequences, 9; with ideals⁵, 14. The acquisition of this vocabulary begins in the third grade and continues, under one name or another, through the eighth; often there is another year in high school. If six years only are available, a rate of two words a week is sufficient for mastery of the 357 new terms. An additional year permits a rate of 3 new words every 2 weeks.

The overlapping from one social science list to the other is relatively small. Only 58 words are shared by the two. This number would be much larger if the comparison were between history and economics, history and political science, or history and sociology. Work in elementary and secondary school thus paves the way for subsequent study of other social sciences. Similarly, work in geography contributes as much to such studies as astronomy, physics, or agriculture as to history.

Hygiene.—A preliminary study by Pressey (77), was followed by more intensive work by Serran (91) and Cole (20). From these sources, a core of 318 essential terms was selected by application of all available criteria. Of these words, 34 are concerned with diet and digestion; 44 name parts or secretions of the body; 16 concern eyes, ears, or teeth; 19 describe circulation; 29 are concerned with the germ theory of diseases; 48 name diseased conditions; 24 describe symptoms; 44 are concerned with medicine, drugs, and treatments; 30 deal with matters of personal or public hygiene; the remaining 30 have to do with processes of reproduction. Since hygiene usually precedes any of the other sciences, the numerous duplicates between it and them do not lessen the load for hygiene. Assuming that instruction began in Grade 3 and continued through Grade 9, a rate of 1.2 words a week would be sufficient for mastery of these necessary terms.

⁴ The description of research in this subject given in Chapter I was restricted to a single study by one author; the present description concerns a summary of the work by all those participating.

⁵ Such as "liberty," or "patriotism."

Chemistry.—The high-school sciences, probably because their heavy load of technical vocabulary is discouraging to the investigator, have been neglected, although the presence of such a load calls loudly for a reduction to the smallest possible number of words. A preliminary study by Pressey (77) was followed by the investigations of Kitzmiller (56), (57) Frank (39), and Lehman (60). Still later, an unpublished study by Cole (17) added one more list of words. The Kitzmiller research is concerned primarily with the vocabulary necessary for laboratory work; the Lehman and Cole lists present frequency counts for words appearing in the two most frequently-used high-school texts in introductory chemistry. The earlier Pressey list was based on six texts, three from college and three from high school, but showed no frequencies, although it did present ratings of importance made by teachers. During the detailed examination of the data, the writer decided to delimit arbitrarily the field to be covered by omitting terms dealing exclusively with organic chemistry. In practically all textbooks analyzed, there was a section—varying in size from a fourth to sixth of the book—presenting a scattering of facts about organic chemistry. In all cases the presentation was meagre, hurried, perfunctory, and so condensed as to be almost unintelligible. As an introduction to the field of organic chemistry, nothing could be much worse. The presence of such a section not only adds elements of confusion but necessitates a needless condensation of the main topics in inorganic chemistry. Illustrations, interesting incidents from the lives of great chemists, comments on everyday applications—all of these must be omitted to make room for the conventional sop to the organic field. The load of new facts, new vocabulary, and new procedures in laboratory work is more than heavy enough when the work is restricted to inorganic chemistry. In presenting the core of essential terms, the writer has therefore thrown out some 150 words essential to any work at all in the organic field.* What chemists may think of this performance is not known; the writer's concern is for the pupil, not the teacher.

Chemistry, like all sciences, has a large number of basic terms. With the inclusion of the abbreviations for the elements and the words essential for laboratory work, the final list mounts to a total of 520 items. Of these, 80 indicate different forms or characteristics of matter; 84 are names of processes; 24 are used in describing temperature changes; 48 are needed for explaining electrolysis, the kinetic theory, and valence; 40 are names of elements; 88 are combining names of elements, prefixes, suffixes, or abbreviations for elements; 82 are names of inorganic compounds; 23 are descriptive of processes in metallurgy; 30 name items of laboratory equipment, and 21 are borrowed from mathematics. Of the 520 terms, 153 appear on the lists for geography, hygiene, arithmetic, or general science, all of which usually precede chemistry. The 367 new words demand a rate of 10.2

* These words are, however, listed later in a footnote for the use of anyone who is interested in them.

a week during one school year. This load may seem heavy, but it is approximately a fourth of the actual number of special terms used in the average introductory text in chemistry.

Physics.—A first study, without frequency counts but with importance ratings, was made by Pressey (77). Two later investigations, by Duckworth (32) and Cole (21) presented frequency counts for two widely used high-school texts in the subject. The final list is about equal to that for chemistry; 530 words seem really essential. However, there is considerable overlapping on the lists for subjects studied before physics is usually taken. There are 14 terms borrowed directly from arithmetic and 30 from algebra or geometry. There are 111 from geography, hygiene, and general science, put together. The number of new terms, is, then, 375. If chemistry has preceded physics, the number^{*} is reduced to 306. Without chemistry, the words must be learned at a rate of 10.4 a week; if chemistry has been studied, 8.7 a week will suffice. Clearly physics should be taken late in one's school career, because it needs all possible support from other subjects in the curriculum.

The 530 terms are divided as follows: 82 for explaining gravity, equilibrium, inertia, and friction; 55 for density, pressure, surface tension, and elasticity; 24 for the wave theory in general; 151 for the phenomena of sound, heat, and light; 103 for magnetism and electricity. In addition, there are 40 words borrowed from chemistry and 75 from mathematics at all levels.

Biology.—A preliminary list in biology, giving importance ratings but not frequencies, was published by Pressey (77). For ten years nothing more appeared. Recent studies by Baird (1), who analyzed the vocabulary used by students in their lecture notes, Cole (19) who made a frequency count of two texts, and Stephenson (101) have added further data. On this admittedly insufficient basis, 693 terms have been proposed—the longest list in the series. It is impossible to reach a final list of fundamental concepts until the content of high-school biology has become more settled than at present. The texts in use vary in the relative amounts of space devoted to botany and zoology. Because biology does not, in many places, receive college credit, there has been less pressure from above toward uniformity than in the case of physics and chemistry. In the meantime the present list may be useful both for teaching and for bringing about a sharper delimitation of material to be included in a high-school course. In this list of 693 terms, there are 277 duplicates from geography, hygiene, arithmetic, and general science—which might logically be expected to precede biology. Fifteen terms have duplicates on the chemistry list, and another 27 on the physics list. Without the two high-school sciences the number of new terms is 11 a week.

^{*} The remaining duplicates indicated by the stars, against words on the physics list appear also on the list for biology. Since few pupils take both these sciences, the duplication of terms is of little help to either.

The total number of words are grouped as follows: chemical or physical terms used as background, 71; structure of living things, 38; plants, trees, and leaves, 142; spore-bearing plants, 70; words needed in classification, 36; terms used in describing invertebrates, 91; for fishes and birds, 25; for describing the human body, 145; food and drugs, 25; agriculture, 24; evolution, 26.

The vocabulary for this subject can undoubtedly be reduced, but adequate research is at present lacking. It is the writer's guess that not more than 500 words are really needed, of which about half will be duplicates.

General Science.—The major research in this subject has been done by Powers (74) (75) whose work consists of extensive and detailed analyses of the enormous vocabulary used in current general science texts. The only other study was made by Pressey (77). Both authors published lists, but that by Powers is by far the better of the two, although the other contains ratings of importance for teaching. The outstanding characteristic of both lists is their length. Either contains approximately 2000 terms. Moreover, consideration of the frequencies and the ratings of importance indicate that emphasis in both text and teaching is spread evenly over a large number of different topics. Any list of essentials would, therefore, be of undue length. There is also little uniformity from text to text as to frequencies, or from teacher to teacher as to judgment of importance. In brief, the lists are not susceptible to the usual "boiling down" process. If it were applied it would produce a total of many hundred equally essential terms—more than for any one science. It is absurd to have in the junior high school a subject whose vocabulary far exceeds that of most high-school subjects.

Even a casual reading of any textbook in general use will illustrate the situation. There is an effort to condense introductory work in chemistry, physics, botany, zoology, physiology, and astronomy into the compass of one small text. This procedure results in such a profuseness of technical matter that a single page may contain as many as 50 scientific terms, of which about 30 are completely new and are introduced without definition. If the purpose of the general science course is to develop an interest in and understanding of science, any means worse than the average present-day text would be hard to devise.⁸ What is needed is not merely an analysis of the present vo-

⁸ An examination of one widely-used textbook reveals the following main topics: Pressure, Heat, Saturation, Humidity, Temperature, the Seasons, Weathering, Rainfall; Molecular Theory, Atomic Theory; Pumps, Compression, Hydraulics, Floating Objects, Submarines, Capillarity, Water Supply, Pollution, Drainage; Mechanical Work, Rollers, Pulleys, Conservation of Energy, Friction, Transformations of Energy; Electricity, Circuits, Fuses, Dry Cells, Measures of Electricity, Electroplating, Storage Batteries; Magnetism, Permanent Magnets, Electromagnets, Motors, Direct and Alternating Currents, Induction; Astronomy, the Moon's Phases, Plants, Comets, the Earth's Orbit, the Sun, the Fixed Stars, Constellations; Weathering, Glaciers, Soil Fertility, Fertilizers, Nitrogen Cycle, Irrigation, Soil Water, Reclamation, Tillage, Erosion, Sedimentation; Plants, Number of Plants, Domestication, Plant Digestion, Structure of Roots, Structure of Leaves, Osmosis, Storage, Assimilation, Respiration, Manufacture of Starch, Plant Synthesis; Bacteria, Types, Molds, Reaction to Disease, Cultures, Inocula-

cabulary burden, but a reformulation of the entire course, including the writing of quite different texts.

In the meantime, the writer presents a tentative list which has been derived by use of a technique that is not dependent upon the contents of any textbooks now in existence. The procedure was simple. The vocabulary lists in chemistry, physics, biology, and hygiene were compared, and all duplicates noted. For example, the word "temperature" appears in every list; "metallic" is included in three; "Fahrenheit" appears in two; "angle of incidence" in only one. The first and second terms are fundamental to high-school science; the third might be included if necessary in order to explain the first term; the latter is the concern of only one subject and has no place in any course devoted to "general" science. The list to be presented later was developed by locating first the terms common to three or all of the four science courses—chemistry, physics, hygiene, and biology. These terms indicate which topics are most useful. Such other words as were needed for a preliminary explanation of the phenomena indicated were next selected from those terms occurring in two of the four lists. The number of words thus selected made, however, less than junior high school pupils could learn in a year's time. The writer therefore selected a few additional words (a total of 51) from physics and biology, with a view to giving a slightly wider sampling of scientific phenomena. In the list, these additional words are indicated. The total number on the final list is 261.

The general science list, as it stands, does not represent the burden of any text now in existence; it indicates, rather, to what terms the burden should be limited. Since the words common to several sciences reveal the most basic concepts, a course built around them would not only reduce the vocabulary load to reasonable limits, but would also concern itself with objectively-proved essentials.

All words in the list for general science are to be found on the lists for other subjects. Of course, those used in high-school subjects do not lessen the load in junior high school; the transfer is in the opposite direction. However, there are 33 duplicates from the geography or arithmetic lists and 46 from hygiene. Since it is impossible to tell when the different topics in hygiene will be studied, the total number of duplicates between it and general science has been divided in half, on the assumption that the chances of meeting any given word for the first time are about equal for the two subjects. This procedure gives only an approximation, of course. The new words

tion, Vaccination, Pasteurization, Pests, Filth; Human Digestion, Absorption, Alimentary Canal, Diet, Stimulants, Drugs, Poisons, Causes of Difficulties in Digestion, Contamination of Food, Food Laws; Circulation, Oxygenation, Deoxygenation, Arteries, Veins, Capillaries, Structure of Heart, Blood Pressure, Reproduction, Yeast, Scum, One-Cellled Organisms, Frogs, Birds, Animals, Seeds; Evolution, Overproduction, Struggle for Survival, Natural Balance; Heredity, Variations, Hybrids, Mendel's Laws, Artificial Breeding.

Considering that the junior high-school pupil has only a meagre vocabulary at the start of his work in general science, it is not surprising that he should find assimilation of the above mass of data next to impossible.

total, then, about 205. In order to master this vocabulary a pupil would need to learn 5.7 words per week throughout his year of general science. This total is not over an eighth of the number of different words used in present texts.

There is a great deal of overlapping from one science list to another, with the consequent reduction in the total number of different scientific words essential to high school. A mere addition of the totals for physics, chemistry, biology, hygiene, and general science gives a sum of 2,302. When all duplicates among these lists and between them and other subjects in the curriculum are omitted, however, it appears that there are only 1,423 *different* terms. This number represents the entire load of a student who studied all the sciences above listed. If a pupil studied only the usually required subjects of hygiene and general science, he would meet approximately 500 different essential terms. If he added chemistry in high school, he will meet about 875. This figure may be considered as the average load of essential scientific vocabulary. If a student takes two of the three high school sciences, the number of different terms rises to approximately 1100. However, with each added vocabulary there comes an added year for study; the load per week remains about the same. The fact is that the sciences are so interrelated, in their fundamentals at least, that the further one goes, the more transfer there is from other fields.

Summary.—The foregoing chapter has presented the general techniques used in the selection of the essential vocabulary of a subject. These procedures involve determination of the frequency with which each technical word appears, its importance for teaching, and its general social value. By applying these three criteria the long lists of terms found in texts may be reduced to carefully considered lists of essentials, without which the subject-matter cannot be understood. These are the terms to be taught first and taught thoroughly, until the pupil recognizes them at once. The remaining special terms—those used only once or twice in a book—may be ignored so far as introductory work is concerned. The students who are interested in each subject will take more advanced courses, in which they will enlarge their vocabularies. The research here presented is concerned exclusively with those terms that *every* pupil must learn in order to understand the fundamentals of each subject.

CHAPTER III

DEVELOPMENT OF CONCEPTS AMONG SCHOOL CHILDREN

Investigations of the Average Degree of Mastery.—Work on the rate at which concepts usually develop, or upon how rapidly they may be caused to develop, has hardly been started. There have, however, been beginnings in the objective measurement of growth rates in the special vocabulary of history and mathematics. An early study by Meltzer (65) traced the growth of forty concepts in history from the third grade through high school. A similar and more extensive study in history has been carried on by Pressey (85), who traced the development of 320 concepts from the fourth grade through to the twelfth. In the field of mathematics there has been a study by Moore (79) in which he showed the growth from the third through the twelfth grades of 106 concepts in arithmetic, 49 in algebra, and 88 in geometry. A few illustrations from the last two studies will be presented in some detail. They demonstrate a situation which probably does not vary in its essentials from one subject to another and is, thence, of general interest.

In the study by Meltzer, the children were asked to write definitions of each word. This procedure obviously introduced two uncontrolled elements—skill in composition and subjectivity in scoring. Because of these factors, the presentation below shows results only from the other two investigations, in which the tests used were objective and called merely for a recognition of the historical or mathematical concepts. In many instances no actual definition was given. The technical word with which the item was concerned had to be understood, however, if the question were to be answered correctly. This procedure was used advisedly because recognition rather than definition is needed in the usual reading situation. The nature of the tests is indicated by the excerpts below. In all cases, the correct answer is to be underlined.

How often does an event happen, if it happens *annually*?
once a month twice a year once in two years
once a year

What is meant by the *dimensions* of a field?
its length and width its area the length of its
diagonal the distance around it

In the expression $\frac{2m^2n^5}{3}$ what is the *exponent* of n ?

2m 3 5 $\frac{2m^2}{3}$ $2m^2$

When is an *injunction* most often used?

during a war during a strike during a battle
during an election

Which word means that two countries have agreed to give each other trade privileges?

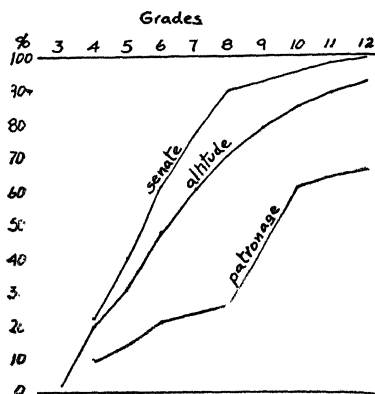
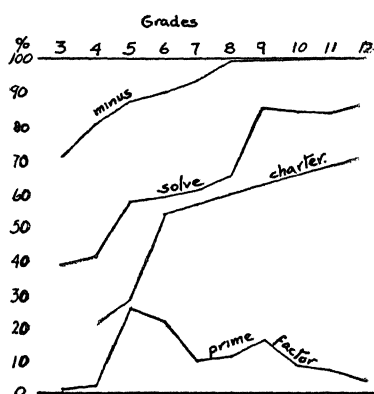
referendum armistice embargo reciprocity

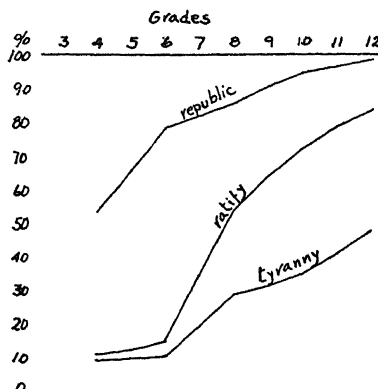
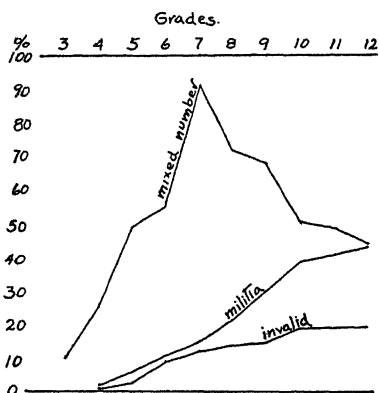
If George, Helen, Frank, Alice, and Kate weigh 63, 77, 84, 98, and 119 pounds *respectively*, how much does Frank weigh?

119 98 84 77 63

The tests in the vocabulary of history and mathematics were given to at least 250 children per grade; in some grades over 1000 pupils were tested. The testing began with the third for arithmetic, the fourth for history, the seventh for algebra and geometry, and was carried in all cases through the twelfth grade. The percent of children passing each item in each grade was then determined. These results show the progressive mastery of each fundamental idea from year to year. The graphs below give results for a few concepts. Since the tests were given during the last month of the school year the curves represent the degree of mastery at the end of each grade.

It will be seen at once that "minus" shows an early acquisition and high retention. "Altitude" is acquired later but is ultimately learned. "Mixed number" is learned by 92 percent in one grade—presumably





where it was taught—but it seems to have been used so little thereafter that there is a marked falling off. “Solve” shows a steady but slow progress, with a final mastery of 82 percent. “Prime factor” is not mastered at any level—and what little achievement there is soon disappears.

In general, the mastery of mathematical ideas was highest in the ninth grade, but even here correct responses on the median item were made by only 84 percent of the children. The median algebra item was known by 45 percent of the pupils, and the median geometry item by 40 percent. The range of mastery per item varied from 5 percent to 100 percent in every grade. If real achievement by a class involves recognition of a concept by at least 90 percent of the pupils, then in the grade where the results were highest only 35 terms in arithmetic, 2 in algebra, and none in geometry show much mastery.

A largely similar situation is revealed by study of the vocabulary in history. The word “republic” shows a mastery by half the children as low as the fourth grade; “senate” shows excellent results by the end of high school and a high level by the eighth grade. “Charter” and “ratify” give less satisfactory results; “patronage” is even poorer. A final mastery by less than half the group is shown by “militia” and “tyranny,” while “invalid” is never understood by any appreciable proportion of the students, presumably because of its more familiar, general meaning.

In the fourth grade the median word, when the 320 were listed from hardest to easiest, was known by 23 percent of the children; similar figures from Grades 6, 8, 10, and 12 are 42 percent, 69 percent, 82 percent, and 90 percent respectively. The range for all grades was wide. In Grade 4 the range was from words known by less than 5 percent to those recognized by 80 percent; for all other grades the range was approximately from 10 percent to 99 percent. The number of words known by 90 percent or more of the pupils in each grade were as follows: Grade 4, 0; Grade 6, 4; Grade 8, 56; Grade 10, 96; Grade 12, 161.

One further comparison was made as to the adequacy of the average pupil's vocabulary in history. In a widely-used text, 862 different technical words were used between once and 300 times. In the highest fifth of this frequency range—from 240 to 300—there were 137 words. Of these 137, selected as most frequent in a single book, 110 were found among the 320 tested. Obviously, any special word that occurs 240 times or more in a 400-page book is highly important. Yet, not one was known by 100 percent of the pupils in the twelfth grade. Only 72 were known by as many as 90 percent; 10 were known by less than 75 percent. In the eighth grade, only 22 of the 110 were known to as many as 90 percent of the pupils. Even if investigation is restricted to the few words used with the highest frequency the mastery is far from adequate. It is not surprising that many students have difficulty with history.

The significant conclusions from these studies are three. (1) Essential ideas which are used every day in the schoolroom and in home assignments are by no means mastered, even by the end of high school. Somehow, an appreciable number of children seem to finish their education without having developed mathematical or historical concepts of general scholastic and social value. In those grades in which concepts are first introduced, barely a half of the children can pick out the correct meaning from other, undeniably wrong, and often irrelevant definitions. One does not wonder that teachers complain of the inability of children to "think through" typical problems when youngsters have such inadequate notions of the elementary concepts. (2) The rate of acquisition varies considerably from one concept to another and can be determined only empirically. Those terms that are especially difficult may either be given special emphasis or else may be postponed until such time as a more efficient mastery seems probable. (3) Certainly the degree of understanding of these basic ideas is not adequate for comprehension of the reading materials used in the various grades. There should be either a better teaching of the concepts so that the materials used at present may become comprehensible or else there should be a revision of the reading matter to take account of the inadequately developed technical vocabulary.

Results of an Experiment in Teaching Vocabulary.—Such poor results as those presented above are not necessary. By directing attention to the meaning of words, by insisting upon mastery, and by using a diagnostic approach to the problems of each pupil, one can bring about a marked improvement with no unusual outlay of time or energy. One teacher of geometry (44) has proved this point. She used a simple test of essential vocabulary in geometry—approximately the list and test subsequently shown—at the beginning of the year. Each

pupil had a copy of the list; when his paper was returned, he checked off the terms he already knew. As the class proceeded, the teacher explained the meaning of all basic terms; when a section of work was completed, she gave a brief test for the words used in it. At the end of the year every student in the class knew almost every word, and the remaining terms had been mastered by more than 95 percent.

Inadequate vocabulary is, then, not necessary. Nor is it caused by any inability to learn on the part of average pupils. It is due, in some measure, to lack of teaching emphasis. However, the main cause is the failure of both text and teacher to isolate the essential core of terms from the several hundred others that are of no great moment. This separation of the sheep from the goats is the necessary first step. Only from then on, does the mastery of vocabulary become a matter of teaching emphasis.

CHAPTER IV

DISTRIBUTION OF CONCEPT "LOAD" OVER THE SCHOOL YEARS

It is of interest to see what demands are made upon the average pupil in each grade, if he is to develop the vocabulary needed for understanding his school work. The summary presented below includes only those technical terms shown by research to be essential—that is, those words listed in a later chapter.

In considering the distribution of load, a few assumptions have to be made. The first (a) concerns the time allotment per subject. In the present instance, it has been assumed that arithmetic will be taught from the second through the eighth grade; this assignment of work gives 7 years for the mastery of the subject. English composition has been allowed a total of 9 years (Grades 4-12); foreign languages, 3 years in junior high and high-school together. Geography has been allotted from Grade 3 throughout Grade 8 (a total of 6 years) while history appears in Grades 4 through 8 and again for a year in high school (also 6 years). Literature is given a total of 6 years—two in junior high and four in senior high school. Hygiene is assigned from Grade 4 through Grade 9—a total of 6 years. All other subjects have been allotted one year each. There is perhaps no school system in which this exact assignment of classes holds. However, some assumptions had to be made, and this one is not too far from the average.

A second assumption (b) concerns the level at which a pupil usually studies a given subject, after leaving the elementary grades. Since there is considerable variation from one place to another, it seemed impossible to work out any general scheme. For this reason, and also partly for the purpose of making the vocabulary load as specific as possible, actual records of two pupils have been selected for study. The two schedules differ somewhat as to electives; there are also a few subjects for which no vocabulary lists are available. However, these two records are sufficiently typical to provide a clear idea of the situation.

One more assumption was necessary. (c) For subjects that cover more than one school year, a larger proportion of words has been assigned to the later than to the earlier years. The exact percentage needed in each grade has never been determined. These guesses are

TABLE I
VOCABULARY LOAD OF GEORGE HILTON*

Subjects	Grades											Total*
	3	4	5	6	7	8	9	10	11	12		
1a. Arithmetic.....	35	35	40	42	45	47						244
b. Algebra.....							56					56
c. Geometry.....									92			92
2a. English Composition.....		10	10	10	12	15	18	20	20	21		136
b. Foreign Language.....						18	20	12				50
c. Literature.....					35	40	45	48	55	59		282
3a. Geography.....	40	55	60	62	63	66						346
b. History.....		43	55	55	60	60				84		357
4a. Hygiene.....		25	45	48	60	70	70					318
b. General Science.....					182							182**
c. Chemistry.....								367				367
d. Physics.....										306		306
e. Biology.....									..	..		...
5a. Shop Work.....					..	..	..	..	..	..		...
6. All other courses.....	..	..	..	..	..	..	..	..	..	..		...
Total per year.....	75	168	210	217	457	316	209	447	167	470		2736
Total per week (to nearest whole number).....	2	5	6	6	13	9	6	12	5	14		

*In all cases, duplicates have been eliminated from the lists. Thus, the algebra total equals the number of terms listed later, minus those words already presented in arithmetic.

**In order to eliminate all duplicates, those between hygiene and general science have been deducted from the latter.

TABLE II
VOCABULARY LOAD OF HELEN SMITH

Subjects	Grades											Total
	3	4	5	6	7	8	9	10	11	12		
1a. Arithmetic.....	35	35	40	42	45	47						244
b. Algebra.....							56					56
c. Geometry.....									..			0
2a. English Composition.....		10	10	10	12	15	18	20	20	21		136
b. Foreign Language.....					12	18	10	10				50
c. Literature.....					35	40	45	48	55	59		282
3a. Geography.....	40	55	60	62	63	66						346
b. History.....		43	55	55	60	60		44		40		357
4a. Hygiene.....		25	45	48	60	70	70					318
b. General Science.....					182		..	..	..	..		182
c. Chemistry.....							..	..	..	..		...
d. Physics.....							..	..	..	..		...
e. Biology.....									416			416
5b. Home Economics.....					..	..	..	..	..	..		...
6. All other subjects.....	..	..	..	..	..	..	..	..	..	..		...
Total per year.....	75	168	210	217	469	316	199	122	491	120		2387
Total per week (to nearest whole number).....	2	5	6	7	13	9	5	3	14	3		

admittedly only approximations. However, since work becomes obviously more advanced with each successive grade, it is a fair guess that the distribution of essential terms is not absolutely uniform through the years, but is likely to increase as the pupil progresses.

The distribution of vocabulary load, as shown by these two tables, is quite uneven, after the elementary level. In junior high school there is a heavy burden, whereas the demands in senior high school are often below the assimilative capacity of the pupils. If children manage to learn six concepts per week in Grade 5, those who last through high school should be able to learn more than is demanded of them. In an effort to bring about an easier transition from elementary to high school, the typical subjects of the latter have been pushed down into the junior high school grades. The vocabulary burden has followed. Consequently, a far too heavy load is laid upon pupils between the ages of twelve and fifteen and a far too light load upon the older pupils. The present study is concerned only with minimum essentials. When one remembers the hundreds of eliminated technical terms that appear in the texts, one begins to appreciate the average child's difficulties of comprehension in the new subjects introduced during junior high school. Some measures should be taken to lighten the load at this level by simplification of the subject-matter, by postponement of it until high school, or by substitution of less academic subjects for those having the heaviest burden of special words.

CHAPTER V

THE RELATION OF TECHNICAL TO GENERAL READING VOCABULARY

The frequency of words in general reading matter is known, through the research of Thorndike (104), who has listed the 20,000 most commonly-used words in the English language. It is both interesting and important to know how often the special words to be listed presently appear in general reading matter, so that one may know what support can be expected from reading done outside of any one class. Thus, the word "river" is an important technical word in geography because it describes a common phenomenon in physical geography. Most children, however, learn "river" in the first grade. Therefore the word offers no difficulty when met in geography. On a more advanced level, are the words "atom" and "molecule"; twenty years ago they were highly technical, but now they appear often enough in general reading matter to be in the 8th or 12th thousand, respectively. The word "hydrolysis," however, is so infrequent as to be outside the most common 20,000 altogether. The teacher can assume "river" to be known by all pupils above the primary grades; she will find that a fair proportion of pupils have met "atom" and "molecule" before beginning their course in science; but she can expect almost complete ignorance of "hydrolysis."

The frequency of each word in general reading is given in the next chapter. Even a cursory examination of the indices—showing in which thousand a word belongs—suggests that some subjects are more helped than others by non-technical reading matter. The indices for the words on the fundamental lists have, therefore, been tabulated by subject. The tabulations appear in Table III.

Arithmetic and geography receive the greatest help from general reading matter. Chemistry, biology, hygiene, and physics, and foreign language obtain the least. The less support a subject receives outside of its textbooks, the more care must be taken by the teacher to make sure that the special terms are adequately explained and learned.

It should also be noted that the essential vocabularies of the elementary school subjects are—as is desirable—easier than those for the more advanced subjects. In arithmetic and geography the median word has a Thorndike rating of 3,000 and 3,700 respectively. Algebra and history come next, followed by geometry and general science. The three linguistic and literary studies all use comparatively unusual

TABLE III

SHOWING THE DISTRIBUTION OF FREQUENCY RATINGS ON THE THORNDIKE 20,000 WORD LIST, OF EACH WORD IN EACH SUBJECT FOR WHICH SPECIAL LISTS ARE LATER PRESENTED

Thousands	Subjects												
	Arith.	Alg.	Geom.	Comp.	Lang.	Lit.	Geog.	Hist.	Hyg.	G. Sci.	Chem.	Phys.	Biol.
1a*	30	6	6			2	21	7		3	4	5	2
1b.....	36	11	14	2	2	2	35	19	2	6	4	6	4
2a.....	24	10	6	5	3	4	37	20	3	9	4	12	9
2b.....	17	4	4	2	0	8	40	27	5	6	9	12	7
3.....	29	10	6	5	1	11	60	48	17	18	22	20	24
4.....	9	3	4	6	3	19	30	45	8	8	15	17	27
5.....	11	8	4	9	4	28	26	40	3	12	18	20	21
6.....	10	9	5	3	2	18	23	23	12	13	17	18	34
7.....	13	6	9	6	5	36	21	51	30	30	26	43	72
8.....	7	7	9	7	5	21	11	37	36	35	29	38	67
9.....	5	3	3	9	3	20	8	20	25	22	26	38	52
10.....	4	2	0	3	4	73	6	16	21	18	14	14	39
11.....	3	1	3	10	4	15	5	13	15	11	18	18	44
12.....	4	1	2	2	2	17	6	5	12	7	16	21	30
13.....	0	1	3	2	3	3	2	12	15	15	22	23	31
14.....	0	0	0	2	0	14	1	4	11	7	13	17	24
15.....	1	0	1	0	0	13	3	2	11	7	10	17	11
16.....	0	0	4	0	0	11	1	8	6	1	6	9	4
17.....	1	0	1	3	1	10	0	2	10	2	10	8	14
18.....	2	2	0	5	1	5	0	3	8	2	7	8	9
19.....	1	2	4	3	0	5	0	1	13	3	6	11	6
20.....	2	4	4	2	0	2	2	1	7	3	13	8	7
Not in List.....	5	10	8	3	7	22	8	13	26	13	173	72	110
Total**.....	214	100	100	89	50	359	346	417	296	251	482	455	648
% in 1st thousand	30.8	17.0	20.0	2.2	4.0	1.1	13.3	6.2	.7	3.6	1.7	2.4	.9
% below 6th thousand.....	72.9	52.0	44.0	32.6	26.0	20.6	72.0	49.4	12.8	24.7	15.8	20.2	14.5
% below 11th thousand.....	91.1	79.0	70.0	64.0	64.0	67.3	91.9	84.7	54.7	71.7	39.0	53.4	55.2
% below 16th thousand.....	94.9	82.0	79.0	82.0	82.0	86.4	96.8	93.3	76.4	90.4	55.4	74.5	76.9
% in the commonest 20,000 ..	97.7	90.0	92.0	96.6	86.0	92.6	97.7	96.9	91.2	94.8	64.1	84.2	83.0
% outside of commonest 20,000 ..	2.3	10.0	8.0	3.4	14.0	7.4	2.3	3.1	8.8	5.2	35.9	15.8	17.0
Thorndike rating of median word.....	3,000	4,800	7,100	9,000	9,000	9,000	3,700	6,100	10,300	8,600	13,900	9,800	10,100

*The indices for the first two thousands show in which half of the thousand a given word occurs. Thus, for arithmetic, 30 words are among the 500 most common words in the language, while 36 occur among the second 500 of the first thousand.

**Since no phrases are given in the Thorndike list, the totals are less than those presented earlier; only single words have indices. The duplicates have not been eliminated, as it seemed desirable to get a picture of the entire difficulty of each vocabulary, regardless of overlapping.

words—the median word for all having a rating of 9,000. The sciences are, as one would expect, the subjects whose vocabulary is helped the least by general reading. The median word for these subjects has a rating between 9,800 and 13,900.

The range as well as the median is of interest. There is no subject so easy that all of its essential words fall within the 20,000 most common words in the language. Every teacher must, therefore, consider the teaching of vocabulary one of the fundamental requirements in the presentation of subject matter of all sorts.

CHAPTER VI

LISTS OF ESSENTIAL ELEMENTARY IDEAS IN THIRTEEN SCHOOL SUBJECTS

The methods by which the lists here presented were determined have already been described. The lists themselves require elucidation, if the teacher is to derive from them the maximum benefit.

It will be seen at once that the words have been grouped. The purpose of this procedure was to get away from an alphabetical presentation, which is undesirable because it lacks any organization by which one can grasp the entire list—or any part of it—as a unit. Two steps have been taken to help in the location of words. Within each section the words are alphabetized. At the end of the book there is a special index listing all terms appearing in any list and giving instructions where to locate them. With these aids, any reasonably logical grouping would appear to have distinct advantages over an unorganized, alphabetical order.

In front of each word appears its serial number. Sometimes there is also an asterisk. This mark means that the term appears in at least one other list. If the teacher wishes to know in which other list or lists the word occurs, she should look up the term in the index; all its appearances are there indicated. To the right of the words in each list there is a number in a column headed, "Thorndike Rating." These ratings are included to show what help each special term may be expected to receive from a child's reading outside of technical subjects.

In a few instances the Thorndike frequency number is enclosed in a parenthesis. Usually, these numbers show the term to be among the commonest words in the language. The parenthesis is used to warn the teacher that everyday meaning does not coincide with the technical meaning. The high frequency of the term in general reading matter may, therefore, prove a hindrance rather than a help. Thus, "root" is in the first thousand of the Thorndike list, but the general usage is little help in mastering algebraic roots; "object" is also in the first thousand, but not in a grammatical sense. In some ways these common words used with a special meaning are more difficult for a pupil than a new word with a single meaning.

Whenever a single word has no rating, the omission indicates that the word is not in the commonest 20,000. Phrases, however, are not rated in any instance since the Thorndike list does not include phrases. Symbols also have no rating.

The lists which follow are not intended for use as discursive reading matter. Any teacher who tries to read one through as if it were a novel is destined to become bored. The lists are for reference, study, and guidance. They should be taken in small doses, with the addition of concentrated thought. Used in this way, they should be of considerable assistance in centering the teacher's attention on the main concepts of the subject-matter she is teaching.

1. ARITHMETIC

	Thorn- dike Rating		Thorn- dike Rating
A. Nomenclature		35. common fraction	
*1. amount	1b	*36. denominator	20
2. count	1b	*37. factor	7
*3. equal	1b	*38. fraction	5a
4. number	1a	39. improper fraction	
5. Roman numeral		*40. invert	6
*6. square root		41. mixed number	
7. whole number		*42. numerator	
*8. zero	5a	*43. reduce	3a
		*44. terms	(2a)
B. Fundamental Processes with Integers		45. fifth	7
*9. add	1a	46. fourth	1b
*10. addition	2b	47. half	1a
11. answer	1a	48. hundredth	8
12. borrow	(3a)	49. quarter	1b
13. carry	(1a)	50. tenth	3a
*14. column	3a	51. third	1a
*15. difference	1b	52. decimal fraction	
*16. divide	1b	53. decimal point	
17. division	3a		
*18. minus	10	D. Units of Measure	
*19. multiply	2a	54. ounce	3a
*20. multiplication	10	55. pound	1b
*21. plus	8	56. ton	3a
*22. product	2b		
*23. quotient	9	*57. feet	(1a)
*24. remainder	3b	58. foot	(1a)
25. row	(1b)	59. inch	1b
*26. sign	(1b)	60. mile	1a
*27. subtract	6	61. rod	2a
28. subtraction	12	62. yard	(1a)
*29. sum	2a		
30. take away		*63. acre	2b
*31. times		64. square inch	
*32. total	2a	65. square foot	
		66. square yard	
C. Fractions		67. square mile	
*33. cancel	8	68. cubic foot	
*34. common denominator		69. cubic inch	

	Thorn- dike Rating		Thorn- dike Rating
70. bushel	3a	*107. size	1b
71. gallon	5b	108. space	1b
72. peck	3b	109. speed	2a
73. pint	4a	110. thick	1b
74. quart	3b	111. volume	3a
		*112. weigh	2a
75. dozen	2a	113. weight	1b
76. pair	1b	*114. wide	1a
		*115. width	3a
77. cent	1b		
78. dime	4b	*116. angle	4b
79. dollar	2a	*117. circle	1b
*80. nickel	4b	*118. figure	(1b)
81. penny	2b	*119. rectangle	5b
		120. solid	3a
*82. century	2b	*121. square	1b
83. day	1a	*122. triangle	6
84. hour	1a		
*85. minute	1b	*123. altitude	6
86. month	1a	*124. area	3a
*87. second	1a	*125. base	2a
88. week	1a	*126. center	1b
89. year	1a	*127. circumference	8
		*128. degree	2a
90. annually	12	*129. diagonal	9
91. daily	2b	*130. diameter	8
92. quarterly	15	*131. hypotenuse	19
		*132. perimeter	20
E. Practical Measurement		*133. pi	
93. breadth	3b	134. point	(1a)
94. broad	1a	*135. radius	8
*95. capacity	4a	136. side	(1a)
*96. contain	1b	137. surface	2b
97. deep	1a		
98. depth	3a	*138. average	3a
*99. dimensions	7	*139. graph	18
*100. distance	1b	*140. scale	2a
*101. height	1b		
102. high	1a	F. Words used in Problems con- cerning Retail Buying	
*103. length	1a	141. apiece	5a
104. long	1a	142. bargain	
*105. measure	1a		
*106. rate	2a		

	Thorn- dike Rating		Thorn- dike Rating
*143. bill	1b	H. Signs and Symbols	
*144. budget	8	*183. +	
145. cash	3b	*184. —	
146. change	(1a)	*185. ×	
147. charge account		*186. ÷	
148. customer	3b	187. %	
149. discount	10	*188. =	
150. exchange	2b	*189. "	
151. expense	2b	*190. '	
152. gain	1b	*191. °	
*153. less	1a	192. \$	
154. loss	1b	193. @	
155. net	(2a)	194. ¢	
156. order	(1a)	I. Words Used in Banking, In- vestments, and Business	
157. per	2b	195. balance	2b
158. price	1b	196. bank	1a
159. profit	2b	197. check	2a
160. purchase	2a	*198. deposit	3b
161. receipt	3b	199. draw out	
162. retail	6	200. endorser	
163. sale	2b	201. maker	3a
*164. trade	1b	202. savings	
165. wholesale	7	*203. bond	3a
166. worth	1b	204. bonus	12
G. Abbreviations		205. broker	10
167. bu.	6	206. brokerage	18
168. doz.	7	*207. business	1b
169. ft.	4a	*208. capital	2b
170. gal.	7	209. commission	3b
171. hr.	7	*210. company	(1a)
172. in.	6	*211. corporation	5b
173. lb.	4b	212. coupon	11
174. min.	12	*213. credit	3a
175. oz.	4b	*214. debt	2a
176. pk.	7	215. dividend	7
177. pt.	6	216. due	2a
178. qt.	5a	217. earnings	9
179. sq.	6	218. face value	
180. wk.	12	*219. finance	7
181. yd.	5a	220. funds	4b
182. yr.	11		

	Thorn- dike Rating		Thorn- dike Rating
*221. income	5a	233. payment	3a
222. insurance	5b	*234. percent	7
223. interest	1b	*235. policy	3b
*224. investment	7	236. premium	7
*225. issue	(2a)	237. principal	2b
226. loan	7	*238. property	2b
227. market	1b	*239. rate	2a
228. maturity	7	240. security	5b
*229. mortgage	6	241. share	(2a)
*230. note	(1b)	*242. speculate	11
231. owe	2a	*243. stock	1b
232. par	17	244. value	1b

Non-Technical Words Pupils Should Know

In addition, there are the following terms that are either non-technical in meaning or else are so common as to be part of one's everyday vocabulary, but are found often in problems read by children. Most of these words are so easy as to cause no difficulty, but it seemed wise to list them.

above, about, across, after, all, allow, always, another, any, anything, around, article, before, below, best, between, both, bought, bring, build, buy, call, certain, compare, complete, consider, cost, date, deliver, down, dry, during, each, earn, edge, either, else, enough, entire, every, except, express, extent, extra, far, farther, fare, form, forward, fill, find, final, following, found, from, front, gone, general, give, hand, hold, how, include, increase, inside, instead, into, kept, kind, large, last, lay, learn, least, left, like, line, list, lost, lower, made, make, many, mark, money, more, most, move, name, need, next, notice, observe, often, only, other, over, paid, part, pay, piece, place, post, purpose, put, real, receive, require, rest, return, rule, salary, same, season, sell, separate, serve, set, several, shade, sheet, short, show, single, small, simple, sold, some, spend, stand, step, supply, suppose, table, tell, think, together, took, trip, try, under, use, way, win, wages, whole, work, write.

2. ALGEBRA

	Thorn- dike Rating		Thorn- dike Rating
A. Nomenclature		*36. transpose	11
1. algebraic		37. unknown	(2b)
2. binomial	20	*38. variable	8
*3. bracket	9		
4. coefficient	19	D. Powers and Roots	
5. consecutive	10	39. ascending order	
*6. expression	5a	*40. cube	5a
7. monomial		41. descending order	
*8. negative	6	42. exponent	13
*9. parenthesis	20	43. extract	5b
10. polynomial		44. power	(1a)
*11. positive	5a	*45. radical	7
*12. quantity	2a	*46. root	(2a)
*13. sign	(1b)	*47. square	(1b)
*14. symbol	4b		
*15. term	(2a)	E. Graph-making	
16. trinomial		*48. graph	18
		*49. linear	18
B. Factoring		*50. origin	(5a)
*17. cases	(1a)	51. plot	(3a)
18. expand	6	52. x-axis (abscissa)	
*19. factor	7	53. y-axis (ordinate)	
20. factorable			
21. factoring		F. Signs	
22. prime factor		*54. =	
		*55. +	
C. Equations		56. \pm	
23. clear of fractions		*57. —	
24. collect	2a	58. $\sqrt{\quad}$	
*25. constant	(2a)	59. .	
*26. degree	2a		
*27. eliminate	7	G. Words borrowed from Arith- metic or Geometry	
*28. formula	8	*60. addition	2b
29. independent	3a	*61. amount	1b
30. members	(1a)	*62. average	3a
31. quadratic equation		*63. contain	1b
32. simple equation		*64. dimension	7
33. simultaneous equation		*65. distance	1b
34. simplify	9	*66. divide	1b
*35. substitute	4a		

	Thorn- dike Rating		Thorn- dike Rating
*67. equal	1b	*93. cancel	8
68. exceed	3a	*94. common denominator	
*69. height	1b	*95. denominator	20
*70. length	1a	*96. fraction	5a
*71. less	1a	*97. invert	6
*72. measure	1a	*98. numerator	
*73. minus	10	*99. reduce	3a
*74. multiplication	6		
75. numerical	12	*100. extremes	(2b)
*76. percent	7	*101. means	(1a)
*77. plus	8	*102. proportion	3a
*78. product	2b	*103. ratio	7
*79. quotient	9		
*80. rate	2a	*104. altitude	6
*81. remainder	3b	*105. angle	4b
*82. respectively	5a	*106. area	3a
*83. square root		*107. base	2a
*84. subtract	6	*108. circle	1b
*85. sum	2a	*109. circumference	8
*86. times		*110. diameter	8
*87. total	2a	*111. figure	(1b)
88. unit	6	*112. hypotenuse	19
*89. volume	3a	*113. perimeter	20
*90. weight	1b	*114. radius	8
*91. width	3a	*115. triangle	6
*92. zero	5a	*116. vertical	6

3. PLANE GEOMETRY

	Thorn- dike Rating		Thorn- dike Rating
A. Types of Angles		32. midpoint	
1. acute angle		*33. parallel	4b
*2. complementary angle		*34. perpendicular	8
3. exterior angle		*35. segment	7
4. interior angle		36. transversal	
5. 90° angle		*37. vertical	6
6. oblique angle			
7. obtuse angle		E. Geometrical Figures and Words Used in Their Description	
8. right angle		*38. figure	(1b)
9. straight angle		39. hexagon	11
10. supplementary angle		*40. parallelogram	16
		41. polygon	19
B. Types of Triangles		42. quadrilateral	19
11. equiangular triangle		*43. rectangle	5b
12. equilateral triangle		44. regular polygon	
13. isosceles triangle		45. rhombus	
14. right triangle		46. trapezoid	19
		*47. triangle	6
C. Words Used in Describing or Measuring Angles or Triangles		*48. area	3a
15. adjacent	7	*49. altitude	6
*16. bisect	13	*50. base	2a
17. coincide	11	*51. diagonal	9
18. common	(1b)	*52. hypotenuse	19
19. congruent	20	53. legs	(1b)
20. corresponding	4b	*54. perimeter	20
*21. degree	2a	55. vertex	6
22. equivalent	7	56. vertices	
23. external	8		
24. included	2a	*57. arc	7
25. opposite	2b	58. chord	7
26. similar	3b	*59. circumference	8
		60. circumscribe	12
D. Words Used in Describing or Measuring Straight Lines		*61. diameter	8
*27. equidistant	17	62. inscribe	8
*28. horizontal	7	*63. pi	
29. intercept	8	64. radii	20
*30. intersect	12	*65. radius	8
31. locus		66. secant	
		67. semicircle	13
		*68. tangent	16

	Thorn- dike Rating		Thorn- dike Rating
F. Words Used in Proofs		106. \curvearrowright	
69. absurdity	9	107. π	
70. axiom	16	108. $:$	
71. construction	4a	109. \therefore	
72. converse	5a	110. $"$	
73. corollary	16	111. $'$	
74. demonstration	7		
*75. directly proportional		H. Additional Words Borrowed from Arithmetic or Algebra	
76. geometric	13	*112. add	1a
77. given	1a	*113. center	1b
78. hence	2a	*114. circle	1b
*79. inversely proportional		*115. denominator	2c
*80. original	3a	*116. difference	1b
*81. plane surface		*117. dimensions	7
82. proof	2b	*118. direction	2a
83. proposition	5b	*119. distance	1b
84. prove	1b	*120. divide	1b
85. respectively	5a	*121. equal	1b
86. symmetry	11	*122. equation	8
87. theorem	15	*123. extremes	(2b)
G. Symbols		*124. formula	8
*88. $=$		*125. height	1b
*89. $+$		*126. length	1a
*90. $-$		*127. means	(1a)
*91. \div		*128. measure	1a
*92. \times		*129. minute	(1b)
93. $//$		*130. multiply	3a
94. \triangle		*131. numerator	
95. \perp		*132. product	2b
96. \odot		*133. proportion	3a
97. \sphericalangle		*134. quotient	9
98. \square		*135. ratio	7
99. \angle		*136. second	(1a)
100. \triangleleft		*137. size	1b
101. $>$		*138. square	1b
102. \cong		*139. substitute	4a
103. \lrcorner		*140. subtract	6
104. $<$		*141. sum	2a
105. $^{\circ}$		*142. width	3a

4. ENGLISH COMPOSITION

	Thorn- dike Rating		Thorn- dike Rating
A. Parts of Speech		31. declarative sentence	
*1. adjective	8	32. exclamatory sentence	
*2. adverb	12	*33. interrogatory sentence	
3. common noun		34. simple sentence	
*4. conjunction	8	35. statement	4a
5. connective	13	36. topic sentence	
*6. parts of speech		b. Structure within a Sentence	
*7. personal pronoun		37. adverbial phrase	
*8. preposition	10	*38. agreement	(5a)
*9. proper noun		*39. antecedent	11
*10. relative pronoun		*40. appositive	
11. substantive	11	41. clause	5a
*12. verb	6	42. dangling participle	
B. Inflected Forms		*43. direct object	
13. gerund	19	44. direct quotation	
*14. infinitive	11	45. divided quotation	
*15. past participle		*46. indirect object	
*16. present participle		47. indirect quotation	
		48. main (independent)	
*17. first person		(principal) clause	
*18. second person		*49. modifier	
*19. third person		*50. modify	9
		51. participial phrase	
*20. future tense		52. phrase	4a
*21. past tense		53. predicate	14
*22. present tense		54. sentence structure	
		*55. subject	1b
*23. nominative case		56. subordinate (dependent)	
*24. objective case		(secondary) clause	
25. possessive (case)			
		D. Written Work	
*26. plural number		*57. composition	4b
*27. singular number		*58. description	3b
C. Sentences		59. dictation	12
a. Types of Sentences		*60. editorial	8
28. complete sentence		*61. essay	6
29. complex sentence		*62. exposition	8
30. compound sentence		*63. narration	20
		*64. narrative	7

	Thorn- dike Rating		Thorn- dike Rating
*65. outline	5a	F. Speech	
*66. paragraph	6	102. argumentation	
*67. resumé	19	103. conversation	3a
*68. review	2b	*104. debate	3b
69. rough draft		*105. expression	5a
*70. summary	10	*106. idiom	17
*71. synopsis	18	*107. language	2a
*72. theme	5a	*108. pronunciation	7
*73. title	2a	109. slang	10
*74. topic	5b	110. speech	(2a)
75. address	2a	G. Capitalizing and Punctuating	
76. body of letter		111. capital letter	
77. business letter		112. italics	18
78. complimentary close		113. punctuation	19
79. correspondence	4b	114. punctuation marks	
80. envelope	4a	115. apostrophe	18
81. formal letter		116. colon	9
82. friendly letter		117. comma	14
83. heading	17	118. dash	(2a)
84. indent	8	119. exclamation point	
85. invitation	3a	120. hyphen	18
86. margin	5a	121. parenthesis	20
*87. note	1b	122. period	2b
88. salutation	7	123. question mark	
89. signature	5b	124. quotation marks	
E. Word Study		125. semicolon	
*90. abbreviation	13	H. Punctuation Marks	
*91. accent	4b	126. :	
*92. consonant	8	127. ;	
93. contraction	3a	128. .	
*94. definition	8	129. ?	
*95. dictionary	7	130. “ ”	
96. misspell	17	131. !	
*97. prefix	11	132. ,	
*98. suffix	18	133. ()	
*99. syllable	5a	134. —	
*100. vocabulary	7	135. ’	
*101. vowel	7	136. -	

5. FOREIGN LANGUAGE

	Thorn- dike Rating		Thorn- dike Rating
A. Parts of Speech			
*1. adjective	8	*34. second person	
*2. adverb	12	*35. third person	
*3. conjunction	8	*36. future tense	
4. definite article		37. imperfect tense	
5. indefinite article		*38. past tense	
6. interrogative pronoun		39. perfect tense	
*7. noun	10	40. pluperfect tense	
*8. parts of speech		*41. present tense	
*9. personal pronoun		42. active voice	
10. possessive adjective		43. passive voice	
11. possessive pronoun		44. imperative mood (mode)	
*12. preposition	10	45. indicative mood (mode)	
*13. pronoun	7	46. subjunctive mood (mode)	
*14. proper noun		*47. infinitive	11
*15. relative pronoun		*48. past participle	
*16. verb	6	*49. present participle	
B. Grammar			
17. conjugation	9	50. principal parts	
18. declension	10	51. auxiliary (verb)	10
19. inflection	9	52. impersonal (verb)	11
20. feminine gender		53. intransitive (verb)	
21. masculine gender		54. irregular (verb)	(4b)
22. neuter gender		55. reflexive (verb)	13
23. accusative case		56. regular (verb)	(2a)
24. dative case		57. transitive (verb)	
25. genitive case		C. Sentence Structure	
*26. nominative case		a. Types of Sentences	
*27. objective case		58. command	1b
28. comparative degree		59. conditional	11
29. positive degree		60. contrary-to-fact	
30. superlative degree		*61. interrogative	12
*31. plural number		62. negative	6
*32. singular number		b. Structure within a Sentence	
*33. first person		*63. agreement	(5a)
		*64. antecedent	11
		*65. appositive	

	Thorn- dike Rating		Thorn- dike Rating
66. direct discourse		*79. consonant	8
(question)		*80. definition	8
*67. direct object		81. derivation	13
68. indirect discourse		*82. dictionary	7
(question)		83. diminutive	8
*69. indirect object		84. ending	5a
70. inverted word order		*85. expression	5a
*71. modifier		*86. idiom	17
*72. modify	9	*87. language	2a
73. predicate adjective		*88. prefix	11
74. predicate noun		*89. pronunciation	7
*75. transposition		90. root	(2a)
76. subject	(1b)	91. stem	(3a)
		*92. suffix	18
		*93. syllable	5a
D. Word Study		94. translate	4b
*77. abbreviate	13	*95. vocabulary	7
*78. accent	4b	*96. vowel	7

6. AMERICAN LITERATURE

	Thorn- dike Rating		Thorn- dike Rating
A. Types of Writing		40. abstract	8
a. Prose		*41. composition	4b
1. adventure story		*42. outline	5a
2. allegory	12	43. paraphrase	16
3. anecdote	7	44. report	1b
4. article	(1b)	*45. review	2b
5. autobiography	12	*46. resumé	19
6. biography	11	*47. summary	10
*7. debate	3b	*48. synopsis	18
*8. description	3b	*49. theme	5a
9. diary	8	*50. topic	5b
*10. editorial	8		
11. epigram	11	b. Drama	
*12. essay	6	*51. act	(1b)
*13. exposition	8	52. burlesque	15
14. fiction	6	53. comedy	5a
15. folklore		54. dialogue	7
16. homily	14	55. drama	5b
17. journal	5b	56. epilogue	17
18. legend	5b	57. farce	7
19. myth	12	58. masque	12
*20. narration	20	59. melodrama	17
*21. narrative	7	60. monologue	17
22. novel	5a	61. prologue	9
23. oration	6	62. scene	(2b)
24. pamphlet	8	63. soliloquy	16
25. parable	9	64. tragedy	4b
*26. paragraph	6		
27. parody	16	c. Poetry	
28. prose	6	65. ballad	6
29. proverb	6	66. blank verse	
30. rhapsody	15	67. dirge	8
31. romance	6	68. elegy	12
32. satire	7	69. epic	10
33. sequel	9	70. free verse	
34. short story		71. idyll	14
35. sketch	5b	72. lyric	9
36. speech	2a	73. mood poem	
37. tale	4a	74. ode	8
38. tract	4a	75. pastoral	7
39. treatise	8	76. poetry	4a

	Thorn- dike Rating		Thorn- dike Rating
77. revery	9	113. hackneyed	
78. saga	17	114. harmonious	7
79. sonnet	7	115. highflown	
		116. humorous	7
B. Types of Authors		117. imaginative	9
80. anon	5b	118. insipid	11
81. anonymous	14	119. journalistic	
82. author	3a	120. literal	7
83. collaborator		121. literary	5b
84. critic	5a	122. melancholy	5b
85. dramatist	11	123. melodious	9
86. journalist	17	124. monotonous	8
87. minstrel	6	125. moral	3a
88. novelist	10	126. morbid	10
89. playwright	11	127. obsolete	11
		*128. original	3a
C. Words Used to Describe the Writing of Authors		129. ornate	12
90. affected	14	130. orthodox	9
91. ambiguous	12	131. pedantic	15
92. authentic	7	132. picturesque	5b
93. coherent	14	133. poignant	14
94. comic	12	134. polished	3b
95. concise	11	135. ponderous	7
96. conventional	9	136. prosaic	16
97. creative	11	137. psychological	13
98. crude	6	138. realistic	14
99. cynical	9	139. rhetorical	16
100. didactic	15	140. rustic	4b
101. droll	11	141. sarcastic	9
102. eloquent	7	142. scholarly	4a
103. emotional	12	143. sensational	12
104. ethical	12	144. sensitive	7
105. fantastic	6	145. sentimental	8
106. fictitious	12	146. sonorous	10
107. figurative	14	147. spiritual	4b
108. flowery	4b	148. stereotyped	15
109. fluent	9	149. stilted	
110. forceful	11	150. stirring	
111. genuine	5a	*151. sublime	5a
112. grotesque	8	152. subtle	5b
		153. superficial	9
		154. sylvan	9

	Thorn- dike Rating		Thorn- dike Rating
155. tedious	5a	194. hyperbole	15
156. terse	19	195. metaphor	10
157. tragic	7	196. onomatopoeia	
158. trite	16	197. paradox	12
159. verbose	18	198. personification	14
160. versatile	17	199. redundancy	17
161. vigorous	7	200. repetition	7
162. vivid	5b	201. simile	8
163. voluminous	13	202. symbolism	
164. whimsical	10		
165. wholesome	4a	203. colloquialism	14
166. witty	5b	204. dialect	7
167. wordy	20	*205. idiom	17
		*206. language	2a
168. brevity	10	207. mannerism	15
169. charm	2a	*208. phrase	4a
170. clarity	2a	209. provincialism	
171. diction	14	*210. slang	10
172. fanaticism	15	211. synonym	11
173. fantasy	9	212. vernacular	14
174. genius	4a	*213. vocabulary	7
175. imagery	11	214. vulgarism	
176. ingenuity	7		
177. integrity	7	E. Words Used in Discussing Novels and Plays	
178. intuition	13	215. action	2a
179. irony	12	216. anticlimax	
180. pathos	12	*217. atmosphere	5b
181. power	1a	218. caricature	12
182. sincerity	6	219. catastrophe	8
183. style	2a	220. character	2a
184. talent	4a	221. characterization	19
185. taste	1b	222. climax	8
186. technique	10	223. delineate	15
187. unity	5b	224. denouement	
		225. depict	8
D. Forms of Speech or Writing		*226. environment	7
188. alliteration	16	227. episode	9
189. allusion	7	228. hero	2b
190. analogy	14	229. heroine	7
191. antithesis	16	230. incident	5b
192. euphemism		231. local color	
193. exaggeration	11		

	Thorn- dike Rating		Thorn- dike Rating
232. motive	3b	268. manuscript	7
233. outcome	10	269. masterpiece	7
*234. plot	3a	270. periodical	6
235. portrayal		271. preface	8
236. setting	18	272. publication	6
237. suspense	9	*273. quotation	7
238. villain	5a	274. reference	5a
		275. revision	10
F. Words Used in Discussing		276. selection	6
Poetry		*277. series	4b
*239. accent	4b	*278. translation	8
240. cadence	7	279. unabridged	
241. canto	14	*280. version	11
242. couplet	17	281. volume	(3a)
243. dactylic			
244. feet	(1a)	H. History	
245. hexameter	15	282. chronicles	5a
246. iambic	15	283. classic	4b
*247. meter	4a	284. contemporary	
248. motif	15	285. criticism	7
249. quatrain		*286. culture	6
250. refrain	5a	287. decadence	16
251. rhythm	10	288. disciple	8
252. rime	11	289. extant	
253. scansion		290. historical	7
254. stanza	9	291. humanist	19
*255. stress	9	292. idealism	12
256. trochaic		293. individualism	18
257. versification	16	294. interpretation	7
258. verse form		295. literature	4b
		*296. movement	3a
G. Words Dealing with Books and		297. mysticism	16
Their Publication		298. philosophy	4a
*259. appendix	8	*299. precedent	7
260. bibliography	17	300. predecessor	7
261. commentary	9	301. realism	18
262. context	15	302. representative	3a
*263. dictionary	7	303. romanticism	19
*264. document	6	304. theology	8
265. edition	6	*305. tradition	7
266. encyclopedia	8	306. transcendentalism	
*267. extract	5b	307. transition	7

7. GEOGRAPHY

	Thorn- dike Rating		Thorn- dike Rating
A. Animals, Plants, Minerals, Fuels, and Soils		37. coral	5a
1. camel	4b	*38. deposit	3b
2. cod	4b	39. diamond	2a
3. hog	3b	*40. fuel	3b
4. llama	15	*41. gas	3a
5. oyster	4a	42. gasoline	5b
6. poultry	4a	43. granite	5b
7. reindeer	5b	44. gravel	5b
8. salmon	6	*45. iron	1b
9. seal	2b	46. ivory	3b
		47. lava	9
		*48. lead	(1a)
10. whale		*49. limestone	7
*11. alfalfa	7	50. marble	2b
		*51. metal	2b
12. barley	4a	*52. mineral	4b
*13. cereal	8	53. mud	2b
14. cocoa	7	54. oil	2a
15. cocoanut	6	*55. ore	10
16. coffee	2a	56. petroleum	6
17. corn	1a	57. quarry	5a
18. cotton	2a	*58. salt	1b
19. flour	2a	*59. silver	1a
20. fruit	1b	*60. soil	1b
21. grain	1b	*61. steel	2a
22. grapes	2a	*62. tin	3a
23. oats	3a	63. turpentine	7
24. olives	3a		
25. potatoes	2a	B. Economic Life	
26. rice	3a	64. acre	2b
27. rubber	3a	*65. agriculture	3a
28. rye	4b	*66. crops	2a
*29. spice	3b	*67. cultivate	3a
30. tea	2a	*68. fertilizer	6
*31. tobacco	3a	69. harvest	2a
32. vegetables	2b	*70. irrigation	7
33. wheat	1b	71. orchard	2b
		*72. plantation	5a
*34. clay	2b	73. produce	2a
35. coal	1b	74. raise	(1a)
*36. copper	2b	75. vineyard	6

	Thorn- dike Rating		Thorn- dike Rating
76. wine	2a	*115. highway	4a
77. yield	2a	116. journey	1b
		117. railroad	2a
78. cattle	2a	*118. railway	3b
79. dairy	3b	119. route	3a
80. flock	2b	120. shipping	
81. grazing	3b	121. steamship	6
82. herd	2b	122. telegraph	4a
83. hide	(1a)	123. telephone	3a
84. leather	2a	124. traffic	4a
85. livestock	15	*125. transportation	4b
86. ranch	7	126. travel	1b
87. wool	2a	127. vessel	2a
		*128. voyage	3a
*88. business	1b	129. wharf	8
89. cloth	1b		
*90. commerce	2b	*130. civilized	6
91. demand	1b	131. fisheries	11
*92. export	5b	*132. frontier	6
93. factory	3a	*133. immigrant	7
*94. goods	(1a)	*134. inhabitant	5a
*95. import	3b	*135. language	2a
*96. industry	2a	*136. migrate	9
*97. machinery	3b	*137. native	2a
*98. manufacture	2b	138. nomad	9
*99. market	1b	139. occupation	3b
100. mills	1b	*140. pioneer	5b
101. mine	(1a)	*141. population	3a
*102. production	5a	*142. primitive	7
*103. raw materials		*143. race	(1b)
104. silk	1b	144. savage	2b
105. supply	1b	*145. settlement	3a
106. textile	10	146. shelter	2a
*107. trade	1b	147. tribe	
		C. History	
108. caravan	6		
109. cargo	4b	*148. ancient	2a
*110. discovery	3	*149. capital	2b
111. dock	4a	*150. century	2b
*112. expedition	4a	*151. colony	2b
*113. explore	4b	152. country	1a
114. freight	3a	*153. domestic	3a

	Thorn- dike Rating		Thorn- dike Rating
*154. foreign	2a	*189. axis	6
*155. government	1b	*190. compass	2b
*156. internal	5b	*191. direction	2a
*157. invention	3b	*192. distance	1b
*158. local	3a	193. east	1a
*159. modern	2b	*194. elevation	6
*160. nation	1b	195. equator	6
*161. province	2b	196. horizon	4b
*162. republic	3b	197. latitude	7
*163. rural	3b	198. level	2a
*164. state	(1a)	199. longitude	7
*165. territory	3a	*200. meridian	6
166. village	1b	*201. navigation	7
D. Physical Geography		202. north	1a
a. Divisions of the Earth		203. point	(1a)
*167. area	3a	*204. pole	2a
168. belt	(2b)	205. prime meridian	
169. border	2a	*206. rotate	9
*170. boundary	3b	207. sea level	
*171. center	1b	208. south	1a
*172. circumference	8	209. tropics	6
*173. continent	3a	210. west	1b
174. district	2b	c. Water and Structures Built on or near the Water	
175. earth	1a	211. basin	(3b)
176. globe	3a	212. bay	1b
177. hemisphere	6	213. breakwater	12
178. location	4b	214. canal	3a
179. map	2a	215. channel	3b
180. planet	4b	*216. current	2b
181. region	2a	217. dam	4a
182. section	2b	218. dike	12
*183. sphere	3b	*219. drainage	8
*184. surface	2b	220. flood	2b
185. zone	3a	221. geyser	12
b. Measurement of the Earth's Surface		222. glacier	12
*186. altitude	6	223. gulf	2b
187. antarctic	11	224. harbor	2b
188. arctic	5b	225. iceberg	7
		226. ice sheet	
		227. mouth	(1b)

	Thorn- dike Rating		Thorn- dike Rating
228. narrows		268. oasis	7
229. navigable	6	269. pasture	2b
230. ocean	1b	270. peak	4b
231. outlet	4b	271. peninsula	5a
232. port	2a	272. plain	(1a)
233. rapids		273. plateau	5a
234. reservoir	8	274. prairie	5b
235. seepage	20	275. range	(2a)
236. sound	(1a)	276. reef	7
237. source	3a	277. ridge	3a
238. spring	(1a)	278. seaport	6
239. strait	(3b)	279. seashore	8
240. stream	1b	280. slope	2b
241. tide	2b	281. steppes	10
242. tributary	4a	282. summit	5a
243. waterfall	5a	283. swamp	4a
244. waterpower		284. tundra	20
*245. waterway	10	285. uplands	8
d. Land Formations		286. valley	1b
246. barrier	5b	287. volcano	7
247. beach	2b	288. wasteland	
248. bottom land		e. Trees	
249. canyon	10	*289. evergreens	7
250. cape	(3a)	290. forest	1b
251. chain	(1b)	291. jungle	9
252. cliff	3a	*292. lumber	2a
253. coast	1a	293. pulp	7
254. coastal	12	*294. timber	4a
255. crater	13	f. Descriptive Words	
256. delta	6	295. abundant	3b
257. desert	2a	296. arid	11
*258. divide	(1b)	297. barren	3b
*259. eruption	9	298. bleak	6
260. highlands	4b	299. dense	4a
261. island	1b	300. extinct	7
262. isthmus	3a	*301. fertile	4a
263. lowlands	5b	302. frigid	9
264. mainland	8	303. rugged	5a
265. marsh	5a	304. shallow	3b
266. meadow	2a	*305. stagnant	7
267. mountain	1a		

	Thorn- dike Rating		Thorn- dike Rating
306. steep	2b	*329. lightning	3a
307. temperate	3b	330. moisture	4b
308. torrid	8	*331. pressure	5a
309. tropical	2b	332. prevailing	
		333. rainfall	6
E. Weather		334. season	1b
*310. annual	12	335. shower	2b
*311. atmosphere	5b	336. storm	1b
*312. barometer	15	*337. temperature	3b
313. blizzard	11	*338. thermometer	5b
314. breeze	3a	339. tornado	11
*315. climate	3a	340. trade wind	
316. cyclone	14	341. typhoon	16
*317. dew	2b	*342. vapor	3a
318. drought	8	*343. weather	1b
319. earthquake	4b		
320. fog	4a	*344. conservation	7
321. freeze	2b	*345. decay	3a
322. frost	2a	346. deforestation	
323. hail	2b	*347. erosion	10
324. "high"	(1a)	*348. natural resources	
*325. humidity	9	*349. reclamation	13
326. hurricane	8	*350. rot	6
327. "low"	(1a)	*351. vegetation	7
328. mist	3a	*352. weathering	

Non-Technical Words Pupils Should Know

In addition, there are the following words that are used so frequently in general reading matter as to be almost certainly known: animal, boat, bridge, city, coast, cow, falls, farm, fishing, food, gold, hay, hill, home, horse, hunting, lake, land, plant, rain, river, road, rock, sea, sheep, ship, shore, snow, sugar, town, water, well, wind, woods, work, world.

8. AMERICAN HISTORY

	Thorn- dike Rating		Thorn- dike Rating
A. Governmental Terms		38. democracy	7
1. agent	4b	39. despotism	10
2. ambassador	5a	40. empire	2b
3. authorities	2b	41. federal	5b
4. consul	6	*42. government	1b
5. dictator	11	43. imperialism	13
6. emperor	3a	44. league	2b
7. governor	2a	45. monarchy	7
8. minister	2b	*46. nation	1b
9. official	3a	*47. republic	3b
10. premier	11	48. soviet	19
11. president	2a	*49. state	1a
12. representative	3a	50. union	2a
13. secretary	3b	51. abolish	5b
14. senator	4a	52. adjourn	9
15. sovereign	4b	53. annex	7
16. statesman	3b	54. annul	12
17. vice-president	17	55. appoint	2a
		56. authorize	7
18. administration	5a	57. compromise	7
19. assembly	3a	58. concede	9
20. bureau	(3b)	59. confiscate	8
21. cabinet	4b	60. enact	7
22. commission	3b	61. enforce	5b
23. committee	3b	62. establish	2a
24. conference	4b	63. exempt	6
25. congress	2b	64. grant	1b
26. council	2b	65. impeach	8
27. department	3a	66. inaugurate	9
28. House of Representatives		67. nullify	16
29. legislature	5b	68. ratify	8
30. parliament	4a	69. regulate	5a
31. quorum	17	70. repeal	7
32. senate	3a	71. repudiate	13
33. session	6	72. sanction	7
		73. secede	11
34. anarchy	9	74. veto	10
35. commonwealth	5b		
36. communism	16	*75. act	(1b)
37. confederacy	6	76. amendment	4a

	Thorn- dike Rating		Thorn- dike Rating
*77. article	(1b)	117. executive	5b
*78. bill	(1b)	*118. function	5a
79. charter	4b	119. judiciary	16
80. constitution	3b	120. legislative	9
81. declaration	7		
82. decree	4a	121. alliance	7
83. doctrine	4b	122. arbitration	11
*84. document	6	123. conciliation	11
85. issue	2a	124. controversy	6
86. law	1a	125. diplomacy	13
87. legislation	7	*126. foreign	2a
*88. measure	(1a)	127. international	8
*89. motion	(2b)	128. negotiation	7
90. ordinance	4b	129. neutrality	11
91. petition	5a	130. peace	1b
92. policy	3b	131. powers	
93. proclamation	7	132. reciprocity	16
94. proposal	7	133. treaty	5a
95. provision	3b	134. ultimatum	
96. reservation	7		
*97. resolution	5a	*135. capital	2b
98. restriction	8	136. centralization	18
99. revision	10	137. civic	9
100. statute	3a	138. civil	3a
101. writ	4b	139. civil service	
		140. county	3a
102. appropriation	8	141. domain	8
103. assessment	13	*142. domestic	3a
*104. budget	8	*143. internal	5b
105. currency	7	144. interstate	11
106. customs	2a	*145. local	3a
*107. debt	2a	146. municipal	10
108. duty	(1b)	147. postal service	
109. expenditure	8	148. states rights	
110. greenback	15	149. township	8
111. levy	6		
112. protective	11	*150. colony	2b
113. revenue	5b	151. dependency	10
114. tariff	7	*152. province	2b
115. tax	2a	*153. territory	3a
116. treasury			

	Thorn- dike Rating		Thorn- dike Rating
B. Political Terms		*193. capital	2b
154. anti-slavery	13	*194. corporation	5b
155. conservative	7	*195. credit	3a
156. democratic	8	196. crisis	8
157. liberal	4a	197. depression	7
158. partisan	8	198. depreciate	10
159. political party		*199. finance	7
160. progressive	4a	*200. income	5a
161. radical	7	201. inflate	10
162. republican	4b	*202. investment	7
163. socialist	9	203. monopoly	7
		*204. mortgage	6
164. ballot	8	205. panic	7
165. campaign	4b	206. prosperity	4b
166. candidate	4a	*207. speculation	8
167. caucus	13	208. stock exchange	
168. convention	4a	*209. stocks	1b
169. deadlock	9	210. trust	(1b)
170. delegate	5b	211. wealth	2a
171. election	3a		
172. filibuster		*212. business	1b
173. initiative	8	*213. commerce	2b
174. lobbying		214. commodity	7
175. majority	3a	*215. company	(1a)
176. minority	8	216. competition	6
177. nominate	8	217. consumer	9
178. opponent	7	218. distribution	5a
179. patronage	8	219. economic	9
180. plank	5a	220. employee	4b
181. platform	4a	221. employer	7
182. politics	9	*222. exploit	5b
183. polls	4b	223. export	5b
*184. primary	(5b)	*224. goods	(1a)
185. referendum	11	*225. import	3b
186. spoils system		*226. industry	2a
187. suffrage	7	227. labor	1b
188. ticket	3a	*228. manufacture	2b
189. unanimous	7	229. merchandise	4a
190. vote	1a	*230. production	5a
C. Economic Terms		*231. property	2b
191. bankrupt	8	*232. raw materials	
*192. bonds	3a	233. rebate	15

	Thorn- dike Rating		Thorn- dike Rating
234. surplus	7	272. prohibition	7
235. strike	(1b)	273. propaganda	11
*236. trade	1b	274. publicity	9
237. trade union		275. public opinion	
238. unemployment		276. reform	4b
		277. regime	11
239. communication	4b	*278. sanitation	8
*240. highway	4a	279. standard of living	
241. public utility		280. tenant	7
*242. railway	3b	*281. tradition	4a
*243. transportation	4b	282. welfare	4a
*244. waterway	10		
D. Social Terms		E. Legal Terms	
245. aristocrat	8	283. alien	7
246. census	10	284. citizen	2b
*247. class	1b	285. emigrant	9
248. community	4b	286. exile	4b
249. homestead	7	287. extradition	16
*250. inhabitant	5a	288. fugitive	5a
251. negro	3a	*289. immigrant	7
252. pioneer	5b	290. nationality	8
*253. plantation	5a	*291. native	2a
*254. population	3a	292. naturalize	12
*255. race	(1b)	293. arbitrary	8
256. rural	3b	294. illegal	9
*257. settlement	3a	295. legal	5b
258. slave	2a	296. rights	(1a)
259. slavery	5a	297. unconstitutional	13
260. society	2b	298. valid	10
261. urban	14		
		299. bribery	11
*262. civilized	6	300. conspiracy	5b
*263. development	4a	301. corruption	6
264. education	3a	302. crime	3a
265. illiterate	10	303. fraud	5b
266. institution	4b	*304. graft	8
*267. invention	3b	305. insurrection	7
*268. movement	3a	306. lynching	14
*269. precedent	7	307. mob rule	
*270. primitive	7	308. rebellion	5b
271. progress	3a	309. revolt	4b

	Thorn- dike Rating		Thorn- dike Rating
310. revolution	4a	*347. continent	3a
311. riot	4b	348. continental	8
312. secession	13	*349. district	2b
313. sedition	10	*350. frontier	6
314. smuggling	9	*351. prairie	5b
315. traitor	4a	*352. region	2a
316. treason	4b	*353. section	2b
317. violation	10		
		*354. agriculture	3a
318. appeal	3a	*355. conservation	3a
*319. case	1a	*356. crops	2a
320. convict	6	*357. irrigation	7
321. court	1b	*358. natural resources	
322. decision	4a	*359. reclamation	13
323. execution	5b		
324. indict	13	*360. discovery	3a
325. injunction	8	361. expansion	7
326. judge	1b	*362. expedition	4a
327. jurisdiction	9	*363. exploration	5b
328. jury	6	*364. migration	9
329. magistrate	4b	*365. navigation	7
330. supreme court		*366. voyage	13
331. testimony	4b		
332. verdict	8	H. Military Terms	
333. witness	2b		
F. Religious Terms		367. aggression	16
334. catholicism		368. allies	8
335. clergy	8	369. armament	12
336. creed	8	370. armistice	14
337. crusade	8	371. belligerents	12
338. heretic	8	372. blockade	7
339. intolerance	13	373. campaign	4b
340. missionary	6	374. conquer	2b
341. persecution	6	375. contraband	16
342. Pilgrims	4a	376. cruiser	10
343. protestant	7	377. defensive	10
344. puritan	6	378. disarmament	
		*379. draft	(3a)
G. Geographical Terms		380. embargo	16
345. area	3a	381. enlist	6
*346. boundary	3b	382. fleet	(2b)
		383. forces	(1b)
		384. fortification	9

	Thorn- dike Rating		Thorn- dike Rating
385. hostile	5b	I. General Terms	
386. indemnity	11	*409. ancient	2a
387. invasion	7	*410. century	2b
388. marines	6	*411. current	(2b)
389. massacre	8	412. decade	7
390. military	3a	413. era	8
391. militia	7	414. event	2a
392. mobilize	18	*415. modern	2b
393. munitions	10	*416. period	2b
394. naval	7	417. reconstruction	9
395. offensive	7		
396. pacifist		418. allegiance	5b
397. pension	6	419. emancipation	9
398. recruit	7	420. equality	6
399. reinforcements	12	421. freedom	2a
400. reparations	13	422. independence	4a
401. reserves	3a	423. justice	2a
402. siege	5b	424. liberty	2a
403. strategic	14	425. oppression	5a
404. surrender	4a	426. patriotism	7
405. troops	2b	427. prestige	12
406. veteran	6	428. privilege	3b
407. volunteer	7	429. self-government	18
408. warfare	6	430. supremacy	9
		431. tyranny	4b

Non-Technical Words

In addition, there are the following terms that have a high frequency in general reading: army, bank, city, committee, country, enemy, general, navy, people, police, popular, private, public, report, school, term, town, village, war.

9. HYGIENE

	Thorn- dike Rating		Thorn- dike Rating
A. Diet		*36. caffeine	14
*1. albumin	17	*37. carbon monoxide	
*2. calorie	9	*38. cocaine	18
*3. carbohydrate	7	*39. drug	3b
*4. cereal	8	40. intoxicant	19
*5. diet	5b	*41. morphine	13
6. fats	1b	*42. narcotic	8
7. malnutrition	20	*43. nicotine	13
*8. nutrition	8	*44. opium	7
*9. protein	7	*45. poison	3a
10. rickets	13	46. stimulant	10
11. roughage	18	47. strychnine	13
12. scurvy	11	*48. tobacco	3a
*13. starch	8		
14. underweight		D. Structure of the Body	
*15. vitamins	11	*49. abdomen	9
*16. yeast	7	*50. adenoids	14
		*51. appendix	8
B. Digestion		*52. artery	7
*17. absorption	7	*53. bladder	9
*18. alimentary canal		54. bowels	4b
19. appetite	3	55. brain	3a
*20. assimilation	9	*56. bronchial tubes	
21. bilious	15	*57. cartilage	11
22. constipation	12	*58. colon	9
23. diarrhea	13	*59. diaphragm	10
*24. digestion	7	60. eardrum	
25. dyspepsia	12	*61. gland	10
*26. elimination	13	*62. intestine	9
27. enema		*63. kidney	7
*28. fermentation	8	*64. larynx	13
*29. gastric juice		*65. liver	4b
30. indigestible	9	66. lung	4b
31. nausea	15	*67. mucous membrane	
32. peristalsis		*68. muscle	6
*33. ptomaine	19	*69. nerve	4a
34. vomit	8	*70. pancreas	10
		*71. pelvis	17
C. Drugs, Stimulants, and Poisons		*72. pharynx	12
*35. alcohol	7	*73. pituitary	17

	Thorn- dike Rating		Thorn- dike Rating
*74. pore	6	F. Circulation and Respiration	
*75. ribs	3a	*109. aorta	14
*76. sense organ		*110. auricle	13
77. sinus	15	*111. blood pressure	
*78. skeleton	7	*112. capillary	8
*79. spine	8	*113. circulation	7
80. stomach	4a	*114. clot	12
81. sweat glands		*115. coagulate	11
*82. tendon	10	*116. corpuscle	9
*83. thyroid	10	*117. haemoglobin	14
*84. tissue	8	*118. pulse	4a
*85. tonsil	15	*119. valve	6
*86. vein	3a	*120. ventricle	9
*87. vertebra	14		
		*121. carbon dioxide	
*88. lymph	9	*122. exhale	8
*89. perspiration	11	*123. inhale	10
*90. saliva	8	*124. oxygen	8
*91. secretion	8	*125. respiration	7
*92. urine	10	126. suffocate	11
		127. vital capacity	
E. Teeth, Ears, and Eyes		G. Germ Theory of Disease	
*93. cavity	7	*128. antiseptic	11
*94. dentine		*129. antitoxin	8
*95. enamel	6	*130. bacillus	10
96. gums	5b	*131. bacteria	7
97. pyorrhea	19	132. communicable	13
		133. contagious	8
98. auditory	12	*134. disinfect	12
*99. eustachian tubes		*135. epidemic	8
100. middle ear		136. fumigate	16
		*137. germ	6
*101. astigmatism		138. germicide	
*102. far-sight	20	*139. hookworm	13
*103. illumination	9	*140. host	(2b)
*104. lens	10	*141. immunity	10
*105. near-sight		*142. infection	8
106. oculist	15	*143. inoculate	18
*107. vision	3b	*144. microbe	12
108. visual	10	*145. parasite	7

	Thorn- dike Rating		Thorn- dike Rating
*146. pasteurize	14	186. whooping cough	
*147. protoplasm	8		
*148. serum	11	187. abscess	16
*149. sterilize	9	188. blackhead	
150. streptococcus		189. blister	6
*151. tapeworm	11	190. boil	(2a)
152. toxic	20	191. bruise	4a
*153. toxin	10	192. bunion	15
*154. vaccine	15	193. callous	13
*155. vaccination	9	194. chapping	7
156. virus	17	195. cramp	8
		196. dislocation	15
H. Diseased Conditions		197. flat foot	
*157. anemia	20	198. fracture	9
158. appendicitis	12	199. pimple	14
159. asthma	17	200. pinkeye	
160. bronchitis	12	201. rash	(4b)
161. cancer	7	202. sprain	13
162. catarrh	10	203. ulcer	10
163. chicken pox		204. wound	(2a)
*164. diabetes	13		
*165. diphtheria	9	I. Symptoms of Abnormal Con- ditions	
*166. disease	2b	205. congestion	10
167. dysentery	11	206. convulsion	9
168. goitre		207. delirium	12
*169. grippe	17	208. dizziness	
170. hydrophobia	15	*209. eruption	9
171. infantile paralysis		210. fainting	2a
172. influenza	8	*211. fever	2b
*173. malaria	8	212. gangrene	14
174. mastoid		213. heartburn	
175. measles	10	214. hemorrhage	18
176. mumps	16	215. hysterics	11
177. neuralgia	20	*216. inflammation	10
178. pleurisy	19	217. insomnia	13
*179. pneumonia	9	*218. irritability	16
180. rheumatism	7	219. nervousness	12
181. scarlet fever		220. paralysis	11
*182. smallpox	9	221. prostration	19
183. tonsillitis	19	*222. pus	17
*184. tuberculosis	11	223. spasms	10
*185. typhoid	7		

	Thorn- dike Rating		Thorn- dike Rating
224. swelling		*262. exposure	8
225. symptoms	8	*263. fatigue	6
*226. temperature	3b	264. gymnasium	6
227. tie		*265. humidity	9
228. unconsciousness	4a	*266. hygiene	8
J. Medicines and Treatments		*267. posture	8
229. adhesive	14	268. recreation	7
230. antidote	9	*269. relaxation	10
231. artificial respiration		*270. resistance	7
232. aspirin	18	*271. ventilation	8
233. bandage	8	*272. vitality	9
*234. bicarbonate	17	*273. adulterate	12
235. carbolic acid		*274. contaminate	8
*236. cathartic	17	*275. decay	3a
237. cauterize	20	*276. filter	7
238. emetic	14	*277. filth	7
239. first aid		*278. impurities	9
240. gargle	18	*279. injurious	6
241. hypodermic		280. mosquito	8
*242. iodine	11	*281. pollution	8
243. medicine	2b	*282. preservative	
244. mercurochrome		*283. quarantine	10
*245. patent medicine		*284. refrigeration	14
246. physic	8	*285. sanitation	8
247. splint	13	*286. sewerage	19
248. tourniquet	19	*287. stagnant	7
249. treatment	3b	*288. vermin	16
250. X-ray	18	L. Reproduction	
251. anaesthetic	19	*289. cell	(3a)
252. convalescence	17	290. chromosomes	
253. ether	7	291. conception	7
254. hospital	3a	292. embryo	7
*255. invalid	7	293. emission	19
256. operation	2b	*294. female	3a
257. sanitarium	15	*295. fertilize	6
258. surgery	8	296. foetus	19
K. Personal and Public Hygiene		*297. generation	3b
*259. draft	3a	298. gonorrhea	
260. exercise	1b	*299. heredity	10
261. exhaustion	7	*300. male	3b

	Thorn- dike Rating		Thorn- dike Rating
301. masturbation		*310. reproduction	7
*302. maturity	9	311. semen	
303. menstruation	20	312. sex organs	
*304. nucleus	7	*313. sexual	8
*305. offspring	5b	314. syphilis	19
*306. ovary	8	315. uterus	18
307. penis		316. vagina	.
308. pregnancy	16	317. venereal	19
309. puberty	15	318. womb	6

Non-Technical Words

In addition, there are the following words that appear with frequency in general reading matter: blood, bone, burn, clean, cut, deaf, dentist, flies, heart, pain, remedy, skin, sweat.

10. GENERAL SCIENCE

Words followed by an asterisk are those that appear in only one list.
See page —.

	Thorn- dike Rating		Thorn- dike Rating
A. States of Matter		*32. distill	6
*1. gas	3a	*33. drainage	8
*2. liquid	3b	*34. filter	7
*3. solid	3a	*35. hydrogen	7
		*36. impurities	9
B. Structure of Matter		*37. insoluble	9
*4. compound	5b	*38. irrigation	7
*5. element	3b	*39. pollution	8
*6. mixture	4a	*40. sewerage	19
*7. substance	3b	*41. soluble	8
		*42. solution	5b
*8. atom	8	E. Nitrogen and Plants	
*9. molecule	12	*43. absorption	7
*10. particle	6	*44. alfalfa	7
*11. composition	4b	*45. crops	2a
*12. conservation	7	*46. fertilizer	6
*13. energy	4b	*47. nitrate	10
*14. matter	(1a)	*48. nitric acid	15
*15. motion	2b	*49. nitrify	
		*50. nitrogen	7
C. Oxygen and Air		*51. nodule	15
*16. analysis	8	*52. soil	1b
*17. carbon dioxide		F. Acids, Alkalies, and Salts	
*18. combustion	7	*53. acid	6
*19. decompose	8	*54. alkali	10
*20. erosion	10	*55. ammonia	9
*21. exhale	8	*56. base	2a
*22. explode	8	*57. liberate	8
*23. inflammable	13	*58. litmus paper	
*24. inhale	10	*59. neutralize	8
*25. monoxide	17	*60. precipitate	7
*26. oxidation	9	*61. reaction	9
*27. oxide	13	*62. salt	1b
*28. oxygen	8	G. Some Minerals and Metals	
*29. rust	3b	*63. alloy	13
D. Hydrogen and Water		*64. calcium	8
*30. dilute	11	*65. copper	2b
*31. dissolve	3b		

	Thorn- dike Rating		Thorn- dike Rating
*66. mercury	5b	*101. evaporate	8
*67. metal	2b	*102. expand	6
*68. metallic	8	*103. Fahrenheit	9
*69. mineral	4b	*104. freezing point	
*70. phosphorus		*105. humidity	9
*71. potassium	9	*106. liquefy	20
*72. silver	1a	*107. moisture	4b
*73. sodium	11	*108. radiation	16
*74. sulfate	9	*109. refrigerator	9
*75. sulfur	6	*110. solidify	13
*76. surfuric acid	17	*111. steam	2a
		*112. temperature	3b
H. Two Gases		*113. thermometer	5b
*77. chlorate		*114. vapor	3a
*78. chlorine	15	*115. ventilation	8
*79. injurious	6	*116. volatile	10
*80. iodine	11		
*81. poisonous	7	K. Pressure and Osmosis	
I. Carbon		*117. altitude	6
*82. carbon	8	*118. atmosphere	5b
*83. charcoal	8	*119. barometer	15
*84. coal	1b	*120. capillarity	20
*85. decay	3a	*121. compression	14
*86. diamond	2a	*122. density	9
*87. fuel	3b	*123. exert	8
*88. vegetation	7	*124. osmosis	10
		*125. permeable	20
J. Heat and Ventilation		*126. piston	11
*89. absolute zero		*127. pressure	5a
*90. boiling point		*128. pump*	3a
*91. calorie	9	*129. rarefy	
*92. centigrade	3	*130. saturate	11
*93. condense	6	*131. vacuum	12
*94. conduction	18	*132. valve	6
*95. contract	3a	*133. volume	3a
96. convection*		L. Levers	
*97. current	2b	*134. balance*	2b
*98. degree	2a	*135. counterbalance*	14
*99. diffusion	11	*136. equilibrium	13
*100. draft	3a	*137. force*	1b

	Thorn- dike Rating		Thorn- dike Rating
138. fulcrum	13	*172. elimination	13
*139. gravity	7	*173. function	5a
*140. inertia	15	*174. gullet*	11
*141. lever	9	*175. inorganic	12
*142. resistance	7	*176. microscopic*	8
*143. weight	1b	*177. nucleus	7
		*178. organic	7
M. Magnetism		*179. organism*	7
		180. Paramecium	
*144. attraction	5b	*181. protoplasm	8
145. induction	13	*182. specialization	14
*146. magnet	7	*183. reproduction	7
*147. negative	6	*184. structure	7
*148. pole	2a	*185. tissue	8
*149. positive	5a	*186. vacuole*	
150. repel	7	*187. waste products*	
151. repulsion	19		
N. An Electric Battery		P. Bacteria	
		*188. antiseptic	11
*152. anode		*189. antitoxin	8
*153. battery	5a	*190. bacteria	7
*154. cathode		*191. contaminate	8
*155. charge	(1b)	*192. diphtheria	9
156. circuit	4b	*193. disinfect	12
*157. conductor	5a	*194. germ	6
*158. discharge	3b	*195. immunity	10
*159. electricity	7	*196. infection	18
*160. electrode	14	*197. inoculate	13
*161. insulate	14	*198. microbe	12
*162. motor	4a	*199. parasite	7
*163. non-conductor		*200. pasteurize	14
*164. terminal	13	*201. preserve	2a
*165. volt	12	*202. sanitation	8
*166. watt	10	*203. serum	11
		*204. smallpox	9
O. Life Processes		*205. sterilize	9
		*206. toxin	10
167. adaptation	8	*207. toxin-antitoxin	
*168. amoeba	15	*208. typhoid	7
*169. assimilation	9	*209. vaccine	15
*170. cell	3a	*210. vaccination	9
*171. digestion	7		

	Thorn- dike Rating		Thorn- dike Rating
Q. A Sample Insect		*237. stamen*	9
*211. abdomen	9	*238. stigma*	(8)
212. adult	8	*239. storage	7
*213. antenna	13	*240. style*	(2a)
214. chrysalis	11	*241. tube	4a
*215. embryo	7		
216. insect	3a	S. Theory of Evolution	
217. larva	7	*242. environment	7
218. molt	19	*243. evolution*	9
219. proboscis	12	*244. fossil*	7
220. pupa	8	*245. heredity	10
*221. segment	7	*246. invertebrate*	13
*222. thorax	11	*247. mammal*	8
*223. trachea	11	*248. modify*	9
		249. natural selection	
R. A Sample Flower		*250. reptile*	8
224. anther	8	*251. species*	7
225. chlorophyll	9	*252. survival*	10
226. dispersal	14	*253. variation*	10
227. nectar	13	*254. vertebrate	10
*228. ovary	8		
229. ovules	10	T. Laboratory Work	
230. petals	6	*255. beaker*	13
231. pistil	8	*256. Bunsen burner*	
232. pollen	10	*257. experiment	5a
*233. propagation	10	*258. laboratory	8
*234. root	2a	*259. litmus paper	
235. sepal	10	*260. microscope	7
236. sperm	9	*261. test tube	

11. CHEMISTRY

	Thorn- dike Rating		Thorn- dike Rating
I. INORGANIC		B. Various Characteristics and Properties of Matter	
A. Various Types and Forms of Matter			
*1. acid	6	35. abrasive	
2. acid salts		36. anhydrous	
*3. alkali	10	*37. antiseptic	11
*4. base	(2a)	*38. aqueous	14
*5. metal	2b	39. brittle	8
*6. mineral	4b	*40. buoyant	8
7. normal salt		*41. caustic	14
*8. salt	(1b)	*42. chemical	8
		43. combustible	14
*9. compound	5b	44. concentrated	7
10. constituent	9	45. corrosive	11
*11. element	(3b)	*46. crystalline	12
*12. inorganic	12	47. deliquescent	20
*13. mixture	4a	*48. diluted	11
*14. organic	7	49. ductile	16
*15. substance	3b	*50. effervescent	16
		51. efflorescent	
*16. gas	3a	*52. elastic	2b
*17. liquid	3b	*53. gaseous	8
*18. solid	3a	54. hygroscopic	
*19. vapor	3a	55. incandescent	15
20. filtrate		*56. inert	8
*21. precipitate	7	*57. inflammable	13
22. residue	10	*58. injurious	6
23. sediment	10	*59. insoluble	9
24. solute		*60. invisible	4b
*25. solvent	13	*61. luminous	7
		62. malleable	17
26. allotropic		*63. metallic	8
27. amorphous	18	*64. opaque	9
*28. ash	3a	*65. phosphorescent	17
29. colloid		66. plastic	10
*30. crystal	4	*67. poisonous	7
*31. emulsion	9	68. properties	(2b)
		69. radioactive	
32. anhydride		70. saline	18
33. hydrate	18	*71. saturated	11
34. hydroxide		*72. soluble	8

	Thorn- dike Rating		Thorn- dike Rating
*73. stable	(2b)	*112. distill	6
*74. supersaturated		*113. evaporate	8
75. tenacious	13	*114. evolve	14
*76. translucent	9	115. exert	8
*77. transparent	7	*116. expand	6
*78. unstable	11	117. expansion	7
79. viscous	18	*118. explode	8
*80. volatile	10	119. explosion	8
C. Various Chemical and Physical		*120. extract	5b
Processes		*121. ferment	8
		*122. fertilize	6
*81. absorb	6	*123. filter	7
*82. absorption	7	124. fume	6
*83. accelerate	17	*125. fuse	9
*84. adulterate	12	*126. galvanize	13
*85. analysis	8	127. glaze	7
86. association	4b	128. ignite	11
87. bleach	6	129. leach	16
88. catalysis		*130. liberate	8
89. char	13	131. liberation	12
90. coagulate	11	132. liquefy	20
*91. combustion	7	*133. liquefaction	19
*92. composition	4b	134. metathesis	
*93. condense	6	*135. neutralize	8
*94. contaminate	8	*136. osmosis	10
*95. contract	3a	*137. oxidation	9
96. conversion	8	*138. pollute	7
97. corrode	9	139. precipitate	7
98. corrosion	9	*140. preserve	2a
99. decant	20	141. purify	6
*100. decay	3a	*142. radiate	11
*101. decompose	8	*143. react	10
102. decrepitate		*144. reduce	(3a)
103. dehydrate		145. refine	3b
104. deodorize		*146. refrigerate	14
*105. deposit	3b	*147. respiration	7
106. dialysis		*148. retard	11
*107. diffuse	5b	*149. saturate	11
*108. disinfect	12	150. slake	10
*109. displacement	20	*151. solidify	13
*110. dissociation		152. solidification	
*111. dissolve	3b	*153. solution	5b

	Thorn- dike Rating		Thorn- dike Rating
*154. sterilize	9	*190. anode	
*155. sublime	5a	*191. battery	5a
*156. substitute	4a	*192. catalyser	
*157. suspend	5a	*193. cathode	
158. synthesis	11	194. cation	
159. tarnish	13	*195. charge	(1b)
160. temper	3a	*196. conductor	5a
*161. vaporize	17	*197. current	2b
162. vulcanize	18	*198. discharge	(3b)
*163. weather	1b	*199. electrode	14
164. weld	8	*200. electrolysis	
D. Terms Used in Describing Effects of Heat and Pressure		*201. electrolyte	20
165. absolute scale		*202. electron	20
*166. absolute zero		*203. equilibrium	13
*167. atmosphere	5b	204. hydrolysis	
*168. barometer	15	*205. insulator	13
*169. boiling point		*206. ion	
*170. calorie	9	207. ionization	
*171. centigrade	13	*208. negative	6
*172. capillarity		*209. non-conductor	
*173. density	9	*210. pole	(2a)
*174. draft	3a	*211. positive	5a
*175. Fahrenheit	9	*212. terminal	13
*176. freezing point		213. affinity	9
*177. humidity	9	*214. atom	8
178. kindling temperature		*215. atomic weight	
*179. moisture	4b	*216. attraction	5b
*180. pressure	5a	*217. conservation	7
*181. specific density		*218. energy	4b
*182. specific gravity		219. globule	12
*183. specific heat		*220. kinetic	17
184. spontaneous combustion		221. mole	(5a)
*185. temperature	3b	*222. molecule	12
*186. thermometer	5b	*223. motion	2b
*187. vacuum	12	*224. particle	6
*188. ventilation	8	225. reversible reaction	
E. Terms Used in Explaining Elec- trolysis, Kinetic Theory, and Valence		226. binary	
189. anion		227. bivalent	
		228. dibasic	
		229. monobasic	

	Thorn- dike Rating		Thorn- dike Rating
230. trivalent		*268. radium	13
231. univalent		269. silicon	19
232. valence		*270. silver	1a
		*271. sodium	11
233. halogen		272. strontium	
234. hydroxyl		*273. sulfur	6
235. periodic law		*274. tin	3a
*236. radical	7	*275. tungsten	14
		*276. zinc	7

F. Names of Chemical Substances

1. Elements		2. Combining Names of Com- mon Elements	
237. aluminum	10	277. arsenic	11
238. antimony	20	278. arsenious	
239. argon		279. chloric	
240. arsenic	11	280. chlorous	
241. barium	20	281. chromic	
242. bismuth	14	282. chromous	
243. boron		283. cobaltic	
244. bromine		284. cobaltous	
245. cadmium		285. cupric	
*246. calcium	8	286. cuprous	
*247. carbon	8	287. ferric	
*248. chlorine	15	288. ferrous	
249. chromium		289. manganic	
250. cobalt	16	290. manganous	
*251. copper	2b	291. mercuric	
252. fluorine		292. mercurous	
253. gold	1a	293. stannic	
*254. hydrogen	7	294. stannous	
*255. iodine	11		
*256. iron	1b		
*257. lead	(1a)	3. Acids	
258. lithium		295. aqua fortis	
259. magnesium	16	296. aqua regia	
*260. manganese	19	297. boric	11
*261. mercury	5b	298. carbonic	18
*262. nickel	4b	299. chromic	
*263. nitrogen	7	300. hydriodic	
*264. oxygen	8	301. hydrobromic	
*265. phosphorous		302. hydrochloric	13
266. platinum	10	303. hydrofluoric	
*267. potassium	9	304. hydrosulfuric	

	Thorn- dike Rating		Thorn- dike Rating
*305. nitric	15	343. oxide	13
306. phosphoric	8	344. pentoxide	
*307. sulfuric	17	345. permanganate	14
308. vitriol	12	346. peroxide	13
4. Alkaline Substances		*347. phosphate	7
		348. silicate	15
*309. ammonia	9	*349. sulfate	9
310. aqua ammonia		350. sulfide	
311. borax	10	351. sulfite	
312. cement	4a	352. tetrachloride	
313. chalk	4b	353. trichloride	
314. concrete	6	6. Other Inorganic Substances	
*315. lime	4a	354. alum	15
*316. limestone	7	355. alundum	
*317. limewater	20	*356. arsene	
318. lye	15	*357. asbestos	11
319. mortar	8	358. bauxite	
320. potash	12	*359. carborundum	
321. quicklime		*360. clay	2b
322. sal ammoniac		361. corundum	
323. soda	6	362. emery	10
5. Salts		363. feldspar	
324. arsenate	14	*364. granite	5b
325. arsenite		365. gypsum	20
*326. bicarbonate	17	366. mica	11
327. bromide	13	367. ozone	
328. carbide		368. phosphene	
*329. carbonate	12	369. plaster of Paris	
*330. chlorate		370. porcelain	7
331. chloride	13	371. pumice	13
332. chromate		*372. quartz	13
333. corrosive sublimate		373. silica	15
334. dichromate		374. talc	20
*335. dioxide	9	375. tin foil	19
336. disulfide		376. water glass	
337. fluoride		G. Metallurgy	
338. iodide	20	377. Bessemer converter	
*339. monoxide	17	378. blast furnace	
*340. nitrate	10	379. by-product	16
341. nitride		380. cast iron	
342. nitrite			

	Thorn- dike Rating	Thorn- dike Rating
381. flux	12	418. ferri-
382. metallurgy		419. ferro-
383. open hearth		420. hydro-
*384. ore	10	421. nitro-
385. pig iron		422. oxy-
386. puddling		423. photo-
387. replacement	15	424. pyro-
388. slag	12	425. thermo-
389. smelter	14	426. thio-
*390. steel	2a	
391. thermite		427. -ate
392. wrought iron		428. -ic
		429. -ide
*393. alloy	13	430. -ite
*394. amalgam	20	431. -ous
395. brass	2b	
396. bronze	6	I. Abbreviations
397. German silver		432. Ag.
398. pewter	12	433. Al.
399. solder	9	434. As.
		435. B.
H. Prefixes and Suffixes		436. Ba
400. bi-		437. Bi
401. di-		438. Br
402. hepta-		439. C.
403. hexa-		440. Ca
404. mono-		441. Cd
405. octa-		442. Cl
406. penta-		443. Co
407. per-		444. Cr
408. sesqui-		445. Cu
409. super-		446. F
410. tetra-		447. Fe
411. tri-		448. H
		449. Hg
		450. I
412. hyper-		451. K
413. hypo-		452. Li
414. meta-		453. Mg
415. ortho-		454. Mn
416. para-		455. N
417. poly-		456. Na

	Thorn- dike Rating		Thorn- dike Rating
457. Ni		*489. litmus paper	
458. O		490. mortar and pestle	
459. P		491. pipette	
460. Pb		492. reagent	17
461. Pt		493. retort	9
462. Ra		494. ringstand	
463. S		*495. spectroscope	17
464. Sb		496. stopcock	
465. Si		*497. test tube	
466. Sn		498. tubing	
467. Sr		499. watch glass	
468. W			
469. Zn		K. Mathematical Terms	
J. Terms Used in Laboratory		*500. cubic centimeter	
470. apparatus	7	*501. gram	12
*471. balance	(2b)	*592. kilogram	10
*472. beaker	13	*503. liter	14
473. bell jar		*504. millimeter	19
474. blow pipe		*505. algebraic	
*475. Bunsen burner		*506. calculate	7
476. clamp	9	*507. capacity	4a
477. crucible	13	*508. directly proportional	
*478. cylinder	5b	*509. coefficient	19
479. evaporating dish		*510. cone	6
*480. experiment	5a	*511. equation	8
481. flask	9	*512. equivalent	7
482. forceps	15	*513. formula	8
483. funnel	12	*514. graph	18
484. gauze	9	*515. inversely proportional	
485. graduate	4a	*516. multiple proportion	
486. hood	3b	*517. percentage	9
487. hornspoon		*518. proportion	3a
*488. laboratory	8	*519. ratio	7
		520. volume	3a

Words Required for Organic Chemistry

For the teacher who is required to use a text containing chapters on organic chemistry, the following words are listed. Hydrocarbons: benzine, ether, gasoline, hydrocarbon, kerosene, lubricating oil, naphtha, paraffin, petroleum, vaseline; acetylene, benzol, ethane, fire damp, marsh gas, methane, oxy-acetylene, totuol, xylol; alizarin, coal tar, turpentine; de-natured alcohol, ethyl alcohol, grain alcohol, glycerol, methyl alcohol, phenol,

wood alcohol, tinctures; anaesthetic, aldehyde, chloroform, ethyl ether, formaldehyde, iodoform; boneblack, charcoal, coke, diamond, fuel, graphite, lamp black.

Nitrogen Compounds: aniline, celluloid, collodion, dynamite, gun cotton, gun powder, nitrobenzol, nitrocellulose, nitroglycerin, trinitrotoluene, TNT; alkaloids, caffeine, cocaine, coal tar, morphine, nicotine, ptomaine, quinine, strychnine, derivatives.

Carbohydrates: cellulose, dextrose, fructose, glucose, carbohydrate, gum arabic, lactose, levulose, maltose, resin, shellac, starch, sucrose, varnish.

Fatty Acids and Their Esters: acetic, acetate, acetone, butyric, carbolic, citric, citrate, cyanide, cyanimide, cyanogen, ester, formate, formic, glyceryl salts, hydrocyanic, lactic, oleic, olein, oxalate, oxalic, olmitic, palmitin, pieric, prussic, prussiate, salycilic, saponification, stearic, stearin, tannate, tannic, tannin, tartaric, tartrate.

Ferments: enzyme, diastase, ferment, yeast.

12. PHYSICS

	Thorn- dike Rating		Thorn- dike Rating
A. Gravity, Equilibrium, Inertia,		37. inertia	15
Friction ¹		*38. kinetic	17
*1. acceleration	17	39. latent	8
2. balance beam		*40. lever	9
3. ball bearing		41. load	(1b)
4. block	(2a)	42. lubricant	11
5. center of gravity		*43. machinery	3b
6. centrifugal	13	*44. mass	(2a)
7. cog	13	*45. matter	(1a)
8. collision	9	46. mechanical advantage	
*9. component	16	47. mechanics	4a
*10. composition	4b	48. moment	(1b)
*11. conservation	7	49. momentum	15
*12. counterbalance	14	*50. motion	2b
13. counterpoise	15	*51. neutralize	8
14. couple	(2b)	52. oscillation	17
15. differential pulley		53. parallelogram of forces	
*16. direction	2a	54. pendulum	9
*17. displacement		*55. period	(2b)
18. dynamics	18	56. pivot	8
19. dyne		57. potential	9
20. eccentric	8	58. power	1a
21. efficiency	9	59. projectile	14
22. effort	(2b)	60. propel	9
*23. energy	4b	61. pulley	11
*24. equilibrium	13	*62. resistance	7
25. erg		*63. resolution	5a
*26. exert	8	64. resultant	15
27. foot pound		*65. revolution	(4a)
28. force	1b	*66. rotation	7
29. friction	7	67. screw	5a
*30. fulcrum	13	*68. specific gravity	
*31. gravity	7	*69. stability	8
32. gyroscope		70. static	14
33. harmonic	13	71. tension	12
34. horsepower	12	72. torsion	
35. impact	13	73. traction	14
36. incline	3a	*74. transformation	8
		*75. translation	(8)

¹ For this first section the words "distance" and "speed" are assumed as known.

	Thorn- dike Rating		Thorn- dike Rating
76. traverse	5b	111. immersion	15
77. uniform	3a	*112. liquefaction	10
*78. unstable	11	113. manometer	
79. velocity	9	*114. molecule	12
*80. vibration	9	*115. osmosis	10
81. winch	17	*116. permeable	20
82. work	(1a)	*117. piston	11
		118. pneumatic	12
B. Density, Pressure, Surface Ten- sion, and Elasticity ²		*119. pressure	5a
83. adhesion	12	*120. properties	2b
*84. altitude	6	*121. rarefy	
85. aneroid		122. rigid	7
86. artesian	12	123. siphon	11
*87. atmosphere	5b	*124. specific density	
88. atmospheric pressure		125. strain	3a
*89. atom	8	*126. stress	9
*90. automatic	7	127. sublimation	
*91. barometer	15	128. submerge	7
*92. buoyancy	14	129. suction	10
*93. capillarity	20	130. surface tension	
94. cohesion	15	131. syringe	19
*95. compression	14	*132. transmission	11
*96. condensation	9	*133. vacuum	12
*97. cylinder	5b	*134. valve	6
*98. density	9	135. vapor pressure	
*99. diffusion	11	136. viscosity	
100. drum	(2b)	*137. volatile	10
*101. elasticity	12	C. Wave Theory ³	
*102. elevation	6	138. amplitude	13
*103. expansion	7	139. antinode	
104. filter pump		140. crest	4a
105. fusion	9	141. curvature	11
106. gauge	9	*142. deflection	14
*107. humidity	9	143. depression	7
108. hydraulic	10	144. emit	9
109. hydrometer	11	145. ether waves	
110. hygrometer		146. frequency	12

² Three words—"balloon, float, pump"—are assumed as known; "displacement" and "specific gravity" appear in Section A above.

³ Four words—"oscillation," "transmission," "velocity," "vibration" have appeared in either Section A or B.

	Thorn- dike Rating		Thorn- dike Rating
147. intensity	7	183. quality	2a
*148. longitudinal waves		184. resonance	17
149. nodes	13	*185. scale	(2a)
*150. phase	10	186. sonometer	
151. periodic vibration		187. sounder	13
152. primary waves		188. sounding board	
*153. propagation	10	*189. sympathetic	8
154. reflection	5a	190. timbre	7
155. secondary waves		191. tuning fork	
156. stationary	7		
157. transverse	11	*192. absorption	7
158. trough	6	*193. absolute zero	
159. wave length		*194. boiling point	
160. wave motion		195. BTU	
161. wave number		*196. calorie	9
		*197. centigrade	13
D. Sound, Heat, and Light ⁴		*198. combustion	7
162. achromatic		*199. conduction	18
163. air column		*200. contraction	8
164. audible	8	*201. convection	
165. beats	(1b)	*202. conversion	8
166. chord	7	*203. current	2b
167. chromatic	18	204. dew point	
*168. diaphragm	10	*205. draft	3a
169. dictaphone		*206. evaporation	8
170. disc	9	*207. Fahrenheit	9
171. discord	6	*208. freezing point	
172. distortion	14	209. generate	8
173. fluctuation	9	210. heat capacity	
174. fundamental	7	211. latent heat	
175. interference	7	*212. liberate	8
*176. membrane	7	213. linear expansion	
177. microphone		214. locomotive	5b
178. octave	15	215. mechanical equivalent	
179. overtone	20	216. melting point	
180. partial	5b	*217. moisture	4b
181. phonograph	9	*218. porous	10
182. pitch	3a	219. radiant heat	

⁴For this section the following words are assumed to be known: echo, loudness, note, telegraph, telephone, tone, fluid, gas, liquid, steam, solid, brightness, camera, color, ray, shade, shadow. The words listed below are also needed, but have already appeared in Sections A, B, or C: harmonic, intensity, condense, friction, fusion, humidity, reflection, transmission.

	Thorn- dike Rating		Thorn- dike Rating
*220. radiation	16	*261. far-sight	20
*221. refrigeration	14	*262. filament	8
*222. saturation	13	*263. filter	7
*223. solidification		264. fluorescence	
*224. specific heat		265. fluoroscope	
*225. supersaturation		266. focal length	
*226. suspension	9	*267. focus	7
*227. temperature	3b	*268. glare	4a
228. thermal	15	269. illumination	9
*229. thermometer	5b	*270. image	3a
230. thermostat		*271. incandescent	15
231. turbine	19	272. incident	(5b)
*232. vapor	3a	273. invert	6
*233. vaporization		*274. invisible	4b
*234. ventilation	8	*275. iris	6
*235. water vapor		*276. lens	10
		*277. luminous	7
236. aberration	15	*278. magnify	5a
237. accommodation	6	*279. medium	(4b)
238. angle of deviation		*280. microscope	7
239. angle of incidence		*281. near-sight	
240. angle of reflection		*282. opaque	9
241. angle of refraction		283. optical	11
*242. artificial	5a	284. optics	
*243. astigmatism		285. penumbra	
244. beam	(2a)	286. periscope	
245. binocular	14	287. perspective	9
246. candlepower		288. phosphorescence	
*247. complementary	14	*289. photography	16
*248. concave	7	290. photometer	
249. conjugate foci		*291. pigment	8
250. converse	12	292. primary colors	
*251. convex	8	293. prism	7
252. critical angle		294. real image	
*253. crystal	4a	295. refraction	18
*254. definition	(8)	*296. retard	11
255. deviate	13	*297. retina	11
256. diminish	5a	298. shutter	6
257. dispersion	13	*299. spectroscope	17
258. diverge	9	300. spectrum	12
259. eclipse	6	301. stereoscope	
260. emergent		302. telescope	8

	Thorn- dike Rating		Thorn- dike Rating
*303. translucent	9	*339. core	(7)
*304. transparent	7	340. coulomb	
305. ultra red		341. declination	15
306. ultra violet		342. detector	12
307. umbra		343. direct current	
308. upright	3a	*344. discharge	(3b)
309. virtual image		*345. dissociation	
*310. visible	4b	346. distributor	12
311. visibility		347. dry cell	
*312. vision	3b	348. dynamo	11
E. Magnetism and Electricity [*]		*349. electricity	7
313. accumulator		350. electrification	
*314. aerial	7	351. electric field	
315. alternating current		352. electrochemical	
316. alternator		*353. electrode	14
317. ammeter		*354. electrolysis	
318. ampere	18	*355. electrolyte	20
319. amplifier		356. electromagnet	
*320. anode		357. electrometer	
*321. antenna	13	358. electromotive force	
322. arc lamp		359. EMF	
323. armature	19	*360. electron	20
324. atomic number		361. electroplating	
*325. atomic weight		362. electroscope	
*326. attraction	5b	363. electrostatic	
*327. battery	5a	364. electrotyping	18
328. brushes	(2a)	*365. fuse	9
*329. capacity	(4a)	*366. galvanic	17
*330. cathode		367. galvanometer	
*331. cell	(3a)	368. generator	15
*332. charge	(1b)	369. grid	16
333. chemical equivalent		370. ground	(1a)
334. circuit	4b	371. heat effect	
335. coil	5b	*372. induction	13
*336. commutator	15	*373. insulation	14
337. compass	2b	*374. ion	
338. contact	3a	375. kilowatt	19
		376. Leyden jar	

^{*} For this section, the terms below are assumed as known: flow, motor, spark, telephone, telegraph, wireless. The following terms are needed, but have appeared in previous sections: condenser, conduction, convert, current, disc, deflection, diaphragm, liberate, microphone, moment, neutralize, oscillation, power, resistance, transformer, transmitter, traverse, uniform.

	Thorn- dike Rating	F. Terms Borrowed from Chem- istry ^a	Thorn- dike Rating
377. lines of force			
378. local action			
379. lodestone		*416. acid	6
380. magnetic dip		*417. alkali	10
*381. magnetism	12	*418. alloy	13
382. magneto	12	*419. amalgam	20
383. make and break		*420. ammonia	9
*384. meridian	6	*421. asbestos	11
385. needle	(2b)	*422. calcium	8
*386. negative	6	*423. carbon	8
*387. non-conductor		*424. carbon dioxide	
*388. nucleus	7	*425. carborundum	
389. ohm	16	*426. caustic	14
390. pith ball		*427. charcoal	8
391. plate	(2a)	*428. chlorine	15
392. polarization		*429. crystalline	12
*393. pole	(2a)	*430. dissolve	3b
394. polarity		431. ebonite	
*395. positive	5a	*432. effervesce	16
*396. reaction	9	*433. element	(3b)
397. rectifier		*434. granular	
398. relative charges		*435. graphite	10
*399. repel	7	*436. hydrogen	7
*400. repulsion	19	*437. insoluble	9
401. roentgen		*438. iodine	11
*402. series	(4b)	*439. litmus	17
403. shaft	4a	*440. manganese	19
404. solenoid		*441. mercury	5b
405. specific attraction		*442. nitrogen	7
406. step down		*443. oxidation	9
407. step up		*444. oxygen	8
408. storage battery		*445. potassium	9
*409. terminal	13	*446. quartz	13
*410. volt	12	*447. radioactive	
411. voltage	16	*448. radium	13
412. voltaic		*449. salt	(1b)
413. voltmeter	19	*450. sodium	11
*414. watt	10	*451. soluble	8
*415. X-ray	19	*452. solution	5b
		*453. tungsten	14

^a The words "copper," "metal," and "silver" are assumed as known.

	Thorn- dike Rating		Thorn- dike Rating
*454. valence	18	*491. formula	8
*455. zinc	7	*492. graph	18
G. Mathematical Concepts ⁷		*493. horizontal	7
456. centimeter	9	*494. hypotenuse	19
*457. cubic centimeter		495. index	6
458. decimeter		496. infinity	14
*459. gram	12	*497. intersect	12
*460. kilogram	10	*498. inversely proportional	
461. kilometer	7	*499. lateral	8
*462. liter	14	*500. linear	18
463. meter	4a	*501. longitudinal	13
464. milligram		502. magnitude	9
*465. millimeter	19	503. maximum	9
466. square centimeter		*504. means	(1a)
		505. minimum	8
		*506. multiple proportion	
*467. arc	7	507. parabola	15
*468. axis	6	*508. parallel	4b
*469. bisect	13	*509. parallelogram	16
*470. calculate	7	*510. perimeter	20
471. calibrate		*511. perpendicular	8
*472. circumference	8	*512. plane	4b
*473. coefficient	19	*513. proportion	3a
474. compute	8	514. quadrant	14
475. concentric	12	*515. quantity	2a
*476. cone	6	*516. radius	8
*477. constant	(2a)	*517. ratio	7
*478. cubic	7	518. reciprocal	9
479. cylinder	5b	*519. segment	7
480. cylindrical	13	*520. sine	8
*481. decimal	12	521. sphere	3b
*482. degree	2a	522. spherical	11
*483. diagonal	9	523. spiral	9
*484. diameter	8	*524. square root	
*485. dimension	7	*525. tangent	16
*486. directly proportional		*526. transverse	11
487. ellipse	15	*527. unit	6
*488. equation	8	*528. variable	8
*489. equidistant	17	*529. vertical	6
*490. extremes	(2b)	*530. volume	3a

⁷ In this section the following words are needed, but are assumed to be known: angle, area, average, diagram, measure, product, rate, triangle, weight.

13. BIOLOGY

	Thorn- dike Rating		Thorn- dike Rating
A. Terms Used in Introductory Section or Organic and Inor- ganic Substances ¹		*36. oxygen	8
		*37. phosphates	7
		*38. phosphorus	
*1. acid	6	*39. potassium	9
*2. alkali	10	*40. properties	2b
*3. ammonia	9	*41. rot	6
*4. ash	3a	*42. sodium	11
*5. calcium	8	*43. soluble	8
*6. carbon	8	*44. starch	8
*7. carbon dioxide		*45. substance	3b
*8. chemical	8	*46. sulphur	6
*9. combustion	7	*47. test tube	
*10. composition	4b		
*11. condense	6	*48. conservation	7
*12. decay	3a	*49. diffusion	11
*13. decompose	8	*50. diluted	11
*14. dissolve	3b	*51. elasticity	12
*15. distill	6	*52. energy	4b
16. dye	4a	*53. evaporation	8
*17. element	(3b)	*54. gravitation	9
*18. fuel	3b	*55. heat energy	
*19. generate	8	*56. liquefy	20
*20. hydrogen	7	*57. magnify	5a
*21. inactive	9	*58. moisture	4b
*22. ingredient	6	*59. negative	6
*23. insoluble	9	*60. osmosis	10
*24. iodine	11	*61. particle	6
*25. liberate	8	*62. permeable	20
*26. lime	4a	*63. porous	10
*27. metallic	8	*64. positive	5a
*28. mineral	4b	*65. pressure	5a
*29. mixture	4a	66. reverse osmosis	
*30. neutralize	8	*67. temperature	3b
*31. nitrate	10	*68. transformation	8
*32. nitric acid		*69. transparent	7
*33. nitrogen	7	*70. vibration	9
*34. oxidation	9	*71. water vapor	
*35. oxide	13		

¹ In this list, the words are assigned to the sections of the subject matter in which they first appeared and are not repeated in subsequent sections.

Thorn-
dike
Rating

Thorn-
dike
Rating

In this section the following words are assumed as known: explode, gas, liquid, metal, solid.

B. Structure of Living Things

*72. absorption	7
*73. adaptation	8
*74. amoeba	15
*75. assimilation	9
*76. cell	(3a)
77. cellular	14
78. chromatin	
*79. colony	(2b)
80. contractile	12
81. cytoplasm	
*82. digestion	7
83. elongate	13
*84. excretion	11
*85. fission	
*86. function	5a
*87. gullet	11
88. intercellular	
*89. laboratory	8
*90. locomotion	12
91. metabolism	15
*92. metazoa	
*93. microscopic	8
*94. minute	(1b)
*95. nucleus	7
96. nucleolus	
97. organ	(2a)
*98. organism	7
*99. Paramecium	
*100. protoplasm	8
101. protozoa	
102. pseudopod	
*103. reproduction	7
*104. respiration	7
*105. specialization	14
106. structure	7
*107. tissue	8

- *108. vacuole
*109. waste products

C. Plants, Trees, and Leaves

110. adventitious	14
*111. aerial	7
112. alternate	6
*113. annuals	12
*114. anther	8
115. aquatic	13
*116. artificial	5a
117. bud scale	
118. bulb	5a
119. calyx	10
*120. chlorophyll	9
*121. core	7
122. corolla	11
123. cortex	12
124. cotyledon	9
125. crossbreed	
126. cross-pollination	
*127. cylinder	5b
128. dicotyledons	
*129. dispersal	14
130. duct	11
131. edible	8
132. endosperm	13
133. epidermis	9
*134. exposure	8
*135. fertilize	6
*136. filament	8
137. fiber	5a
138. fibrous	11
139. fleshy	12
140. floral envelope	
141. fruit stalk	
142. geotropism	
143. germination	11
144. herb	4a
145. hilum	
146. hybrid	8
147. hydrotropism	

	Thorn- dike Rating		Thorn- dike Rating
*148. hypercotyl		190. stoma	17
149. immature	11	*191. storage	7
*150. injurious	6	*192. style	(2a)
151. kernel	7	193. tap root	
152. layer	5a	194. tendril	9
153. leaf scars		195. transmit	9
154. legume	12	196. tuber	10
155. mature	4a	197. tubercle	14
156. microphyle			
157. monocotyledons		198. abscission layer	
*158. nectar	13	199. annual rings	
*159. nitrify		200. bast	18
*160. nodule	15	201. cambium	12
*161. ovary	8	202. cuticle	11
*162. ovule	10	203. cuttings	
163. parasitic	11	204. deciduous	12
164. perennial	11	*205. evergreen	7
*165. petal	6	206. foliage	6
166. photosynthesis		207. girdling	
*167. pistil	8	*208. grafting	
168. pistillate	19	209. groove	6
169. placenta		210. heliotropism	
170. plumule	14	211. internode	
*171. poisonous	7	212. lenticel	
*172. pollen	10	213. lumber	2a
173. pollination	17	214. medullary rays	
174. polycotyledons		215. mesophyll	
175. pome		*216. midvein	
*176. propagation	10	*217. node	13
177. receptacle	7	218. pallisade layer	
178. root cap		219. petiole	
179. root stock		220. pith	8
180. scar	4b	221. pith rays	
181. seed coat		222. pruning	(4b)
182. self-pollination		*223. radiate	11
*183. sepal	10	224. resinous	
184. sheath	6	225. rind	8
*185. sperm	9	226. sap	4a
186. spermary		227. seedling	8
*187. stamen	9	228. shoots	(2a)
188. staminate		229. shrubs	(4a)
*189. stigma	(8)	230. slips	(2a)

	Thorn- dike Rating		Thorn- dike Rating
231. spongy	9	269. scavenger	12
232. stalk	4a	270. scum	10
233. stomates		*271. sexual	8
*234. timber	4a	272. smut	12
*235. tube	4a	273. spirillum	
236. tubular	11	274. spore	9
237. vascular bundles		275. wart	11
238. wood fibre		276. yeast	7
239. complex	7	277. agar	
*240. concave	7	*278. culture	(6)
*241. convex	8	279. gelatine	10
242. cross-section	19	*280. host	(2b)
243. crosswise	12	281. medium	(4b)
*244. horizontal	7		
*245. lateral	8	*282. anemia	20
246. lengthwise	10	*283. diphtheria	9
*247. longitudinal	13	*284. disease	2b
*248. primary	5b	*285. dysentery	11
*249. secondary	7	*286. hydrophobia	15
*250. terminal	13	*287. malaria	8
*251. vertical	6	*288. pneumonia	9
		*289. ptomaine	19
D. Spore-bearing Plants and Dis- eases Caused by Them		*290. smallpox	9
252. algae	10	291. tetanus	13
253. asexual	12	*292. tuberculosis	11
*254. bacillus	10	*293. typhoid	7
*255. bacteria	7		
256. blight	7	*294. adulteration	12
257. coccus		*295. antiseptic	11
*258. ferment	8	*296. antitoxin	8
259. frond	17	*297. contaminate	8
260. fungus (i)	8, 14	*298. disinfect	12
*261. germ	6	*299. drainage	8
262. lichen	9	*300. epidemic	8
*263. microbe	12	*301. hygienic	15
264. mildew	8	*302. immunity	10
265. mold	(8)	*303. impurity	9
266. mycelium		*304. infection	18
*267. parasite	7	305. injection	13
*268. rust	(3b)	*306. inoculation	18
		307. mortality	7

	Thorn- dike Rating		Thorn- dike Rating
*308. pasteurize	14	347. vegetarian	7
*309. pollution	8	*348. vertebrate	10
310. preservative	12		
*311. pus	17	349. accessory	10
*312. quarantine	10	350. analogous	13
*313. resistance	7	351. anterior	9
*314. sanitation	8	352. dorsal	10
*315. serum	11	*353. external	8
*316. sewerage	19	354. homologous	
*317. sterilize	9	*355. internal	5b
318. toxin-antitoxin		356. posterior	10
*319. vaccine	15	357. ventral	13
*320. vaccination	9		
*321. vitality	9	F. Invertebrates	
E. Terms Used in Classification and Description		*358. abdomen	9
322. amphibian	13	*359. adult	8
323. arthropod		*360. antenna	13
324. bivalve	14	361. antennules	
325. branch	(1b)	362. aphid	
326. carnivorous	11	363. appendage	9
*327. class	(1b)	364. beetle	5b
328. crustacean	12	365. blastula	
*329. family	(1a)	366. borer	
330. genus	11	*367. breed	3b
331. genera	18	368. bristle	7
*332. insect		369. castings	20
*333. invertebrates	13	370. carapace	
*334. mammal	8	*371. cavity	7
335. mollusk		372. cephalothorax	
336. myriapod		373. chitin	
337. order	(1a)	*374. chrysalis	11
338. polyp	15	365. cilia	10
339. primate	13	376. cocoon	10
340. quadruped	13	*377. coloration	15
*341. reptile	8	378. communal	15
342. rodent	14	*379. conjugation	8
343. ruminant	18	380. crop	(2a)
*344. species	7	381. cuticle	11
345. ungulate		382. cyst	14
346. variety	3a	383. drone	7
		384. ectoderm	
		385. entoderm	

	Thorn- dike Rating		Thorn- dike Rating
386. feeler	9	428. sac	11
*387. female	3a	429. scab	12
*388. filth	7	*430. scale	(2a)
389. flipper		*431. segment	7
*390. generation	3b	432. setae	
391. gills	7	433. spiracle	
392. girdle	4a	*434. stagnant	7
393. gizzard	13	435. swarm	3b
*394. granular		436. swimmeret	
395. grubs	8	*437. tapeworm	11
*396. gullet	11	438. telson	
397. habitat	15	439. tentacle	12
*398. hookworm	13	440. thoracic	17
399. inbreed	20	*441. thorax	11
400. labium		442. ticks	(3b)
401. labrum		*443. trachea	11
*402. larva	7	444. trichina	
403. lice	11	445. vent	6
404. lobe	11	*446. vermin	16
405. maggot	8	447. weevil	11
*406. male	3b	448. wiggler	
407. mandible	12		
408. mate	2b	G. Fish and Birds	
409. maxilla		449. air bladder	
410. maxilliped		450. barbs	13
*411. membrane	7	451. barbules	
412. mesentery		452. brood	4a
413. mesothorax		453. caudal	18
414. metamorphosis	8	454. compound eye	
415. metathorax		455. embryo	
416. molt	19	456. fins	7.
417. nymph	(5a)	457. gill arch	
*418. offspring	5b	458. gill bailer	
419. ovipositor		459. gill raker	
420. palpus		460. hibernate	13
421. pest	9	461. incubation	
*422. pigment	8	462. iridescent	
423. proboscis	12	*463. migration	9
424. prolific	8	464. milt	
425. progeny	8	465. nictitating	
426. prothorax		466. operculum	
*427. pupa	8	467. plumage	9

	Thorn- dike Rating		Thorn- dike Rating
468. prehension		2. Circulation	
469. rachis		*507. aorta	14
470. spawn	7	*508. artery	7
471. venom	8	*509. auricle	13
472. waterproof	8	*510. blood pressure	
473. yolk	10	*511. capillary	8
H. Systems of the Body		*512. circulation	7
1. Skeleton and Muscles		*513. clot	12
474. anatomy	7	*514. coagulate	11
475. arch	2b	*515. corpuscle	9
476. canine	10	516. deoxygenated	
*477. cartilage	11	*517. haemoglobin	14
*478. contract	3a	*518. lymph	9
479. cranial	19	519. oxygenate	
480. cranium	14	520. plasma	10
*481. dentine		521. pulsate	6
*482. enamel	6	*522. pulse	4a
*483. expand	6	*523. valve	6
484. extensor		524. vascular	13
*485. fatigue	6	525. vaso-motor	
486. flexor		*526. vein	3a
487. incisor	14	*527. ventricle	9
488. involuntary	7	3. Swallowing and Breathing	
*489. lever	9	*528. adenoid	14
490. ligament	14	*529. bronchial tubes	
491. marrow	7	*530. diaphragm	10
*492. muscle	6	*531. draft	3a
493. pectoral	16	532. epiglottis	20
*494. pelvis	17	533. expiration	10
*495. posture	18	534. glottis	
*496. relax	7	535. inspiration	5b
*497. rib	3a	*536. larynx	13
498. skeleton	7	*537. pharynx	12
499. skull	5a	538. pleura	
*500. spine	8	539. pulmonary	11
501. striped		*540. tonsil	15
*502. tendon	10	*541. ventilation	8
503. trunk	5a	4. Nervous System	
504. unstriped		542. autonomic	7
*505. vertebra	14	543. axon	
506. voluntary	6		

	Thorn- dike Rating		Thorn- dike Rating
544. cerebrum	14	582. hormones	
545. cerebellum	17	*583. pituitary	17
546. convolution	14	*584. secretion	8
547. dendrite		*585. thyroid	14
548. ganglion	13		
549. impulse	7	7. Digestion	
550. inhibit	14	*586. alimentary canal	
551. instinct	5a	*587. appendix	8
*552. irritability	16	588. bile	12
553. medulla	18	*589. colon	9
*554. motor	(4a)	*590. emulsion	9
555. nervous system		591. enzyme	20
556. neuron		592. gall bladder	
557. olfactory	11	*593. gastric juice	
558. optic	9	594. glycogen	
559. plexus	20	*595. intestine	9
560. reflex	9	596. lacteals	17
561. sensation	7	*597. liver	4b
*562. sense organs		598. masticate	17
563. sensitive	7	*599. mucous membrane	
564. sensory	14	600. oesophagus	
565. spinal cord		*601. pancreas	10
566. stimulus	10	602. pepsin	14
567. sympathetic	8	603. peritoneum	
		604. rectum	17
5. Sense Organs		*605. saliva	8
568. cornea	13	606. selective absorption	
*569. eustachian tubes		607. spleen	6
*570. focus	7	608. villi	
*571. illumination	9	609. viscera	17
*572. iris	6		
*573. lens	10	8. Excretion	
574. nasal	9	610. anal	13
575. nostril	4a	611. anus	15
*576. pupil	(2a)	*612. bladder	9
*577. retina	11	*613. elimination	13
578. semicircular canals		*614. kidney	7
579. tympanic membrane		*615. perspiration	11
		*616. pore	6
6. Glands		617. urea	12
580. adrenal		*618. urine	10
*581. gland	6		

	Thorn- dike Rating		Thorn- dike Rating
I. Foods and Drugs			
*619. albumin	17	*655. fertile	6
*620. calorie	9	*656. fertilizer	6
*621. carbohydrate	7	*657. fisheries	11
622. cellulose	9	658. fodder	6
623. diastase		659. hatchery	17
*624. diet	5b	*660. irrigation	7
625. foodstuffs	9	*661. natural resources	
626. grape sugar		662. reforestation	
627. mineral salts		663. retention	13
628. nutrient	9	*664. rotation	7
*629. nutrition	8	*665. soil	1b
*630. proteins	7	*666. vegetable	2b
*631. vitamins	11	667. vegetable mold	
K. Theory of Evolution			
632. addiction		668. ancestor	4a
*633. alcohol	7	669. cycle	9
634. alkaloid	12	670. degenerate	7
*635. caffeine	14	671. dependence	8
*636. cocaine	18	672. descendent	7
*637. drugs	3b	*673. development	4a
*638. morphine	13	674. dominant	7
*639. narcotic	8	*675. environment	7
*640. nicotine	13	676. evolution	9
*641. opium	7	678. fossil	7
*642. patent medicine		*679. heredity	10
*643. toxin	10	680. hybrid	8
J. Relation to Agriculture			
		681. inheritance	5a
*644. agriculture	3a	682. isolation	10
*645. alfalfa	7	683. mimicry	15
*646. cereal	8	684. modification	12
647. citrus		685. natural selection	
*648. climate	3a	*686. primitive	7
649. clover	4b	*687. protective coloration	
*650. crops	2a	688. recessive	11
*651. cultivate	3a	689. sport	(2a)
652. domesticate	12	690. survival	10
*653. drought	8	*691. transmission	11
*654. erosion	10	692. variation	10
		693. vestigial	

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* In this appendix the following abbreviations have been used:

Ar.—Arithmetic	Lt.—Literature	GS.—General Science
Alg.—Algebra	Gg.—Geography	C.—Chemistry
Gm.—Geometry	H.—History	P.—Physics
E.—English Composition	Hy.—Hygiene	Bi.—Biology
L.—Language		

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 suspension, C. 157, P. 226
 swamp, Gg. 283
 swarm, Bi. 435
 sweat glands, Hy. 81
 swellings, Hy. 224
 swimmeret, Bi. 436
 syllable, E. 99, L. 93
 sylvan, Lt. 154
 symbol, Alg. 14
 symbolism, Lt. 202
 symmetry, Gm. 86
 sympathetic, P. 189, Bi. 567
 symptoms, Hy. 225
 synonym, Lt. 211
 synopsis, E. 71, Lt. 48
 synthesis, C. 153
 syphilis, Hy. 314
 syringe, P. 131

 take away, Ar. 30
 talc, C. 374
 tale, Lt. 37
 talent, Lt. 184
 tangent, Gm. 68, P. 525
 tapeworm, Hy. 151, Bi. 437
 tap root, Bi. 193
 tariff, H. 114
 tarnish, C. 159
 taste, Lt. 185
 tax, H. 115
 tea, Gg. 30
 technique, Lt. 186
 tedious, Lt. 155
 telegraph, Gg. 122
 telephone, Gg. 123
 telescope, P. 302
 telson, Bi. 438
 temper, C. 160
 temperate, Gg. 307
 temperature, Gg. 337, Hy. 226, GS. 112,
 C. 185, P. 227, Bi. 67
 tenacious, C. 75
 tendon, Hy. 82, Bi. 502
 tendril, Bi. 194
 tenement, H. 280
 tension, P. 71
 tentacle, Bi. 439

 tenth, Ar. 50
 terminal, GS. 164, C. 212, P. 409,
 Bi. 250
 terms, Ar. 44, Alg. 15
 territory, Gg. 165, H. 153
 terse, Lt. 156
 testimony, H. 331
 test tube, GS. 261, C. 497, Bi. 47
 tetanus, Bi. 291
 tetra-, C. 410
 tetrachloride, C. 352
 textile, Gg. 106
 theme, E. 72, Lt. 49
 theology, Lt. 304
 theorem, Gm. 87
 thermal, P. 228
 thermite, C. 391
 thermo-, C. 425
 thermometer, Gg. 338, GS. 113, C. 186,
 P. 229
 thermostat, P. 230
 thick, Ar. 110
 thio-, C. 426
 third, Ar. 51
 third person, E. 19, L. 35
 thoracic, Bi. 440
 thorax, GS. 222, Bi. 441
 thyroid, Hy. 83, Bi. 585
 tie, Hy. 227
 ticket, H. 188
 ticks, Bi. 442
 tide, Gg. 241
 timber, Gg. 294, Bi. 234
 timbre, P. 190
 times, Ar. 31, Alg. 86
 tin, Gg. 62, C. 274
 tin foil, C. 375
 tissue, Hy. 84, GS. 185, Bi. 107
 title, E. 73
 tobacco, Gg. 31, Hy. 48
 ton, Ar. 56
 tonsil, Hy. 85, Bi. 540
 tonsillitis, Hy. 183
 topic, E. 74, Lt. 50
 topic sentence, E. 36
 tornado, Gg. 339
 torrid, Gg. 308
 torsion, P. 72
 total, Ar. 32, Alg. 87
 tourniquet, Hy. 248
 township, H. 149
 toxic, Hy. 152
 toxin, Hy. 153, GS. 206, Bi. 643
 toxin-antitoxin, GS. 207, Bi. 318
 trachea, GS. 223, Bi. 443
 tract, Lt. 38
 traction, P. 73
 trade, Ar. 164, Gg. 107, H. 236
 trade union, H. 237
 trade wind, Gg. 340
 tradition, Lt. 305, H. 281

- traffic, Gg. 124
 tragedy, Lt. 64
 tragic, Lt. 157
 traitor, H. 315
 transcendentalism, Lt. 306
 transformation, P. 74, Bi. 68
 transition, Lt. 307
 transitive verb, L. 57
 translation, L. 94, Lt. 278, P. 75
 translucent, C. 76, P. 303
 transmission, P. 132, Bi. 691
 transmit, Bi. 195
 transparent, C. 77, P. 304, Bi. 69
 transportation, Gg. 125, H. 243
 transpose, Alg. 36, L. 75
 transversal, Gm. 36
 transverse, P. 157, P. 526
 trapezoid, Gm. 46
 travel, Gg. 126
 traverse, P. 76
 treason, H. 316
 treasury, H. 116
 treatise, Lt. 39
 treatment, Hy. 249
 treaty, H. 133
 tri-, C. 411
 triangle, Ar. 122, Alg. 115, Gm. 47
 tribe, Gg. 147
 tributary, Gg. 242
 trichina, Bi. 444
 trichloride, C. 353
 trinomial, Alg. 16
 trite, Lt. 158
 trivalent, C. 230
 trochaic, Lt. 256
 troops, H. 405
 tropical, Gg. 309
 tropics, Gg. 209
 trough, P. 158
 trunk, Bi. 503
 trust, H. 210
 tube, GS. 241, Bi. 235
 tuber, Bi. 196
 tubercle, Bi. 197
 tuberculosis, Hy. 184, Bi. 292
 tubing, C. 498
 tubular, Bi. 236
 tundra, Gg. 284
 tungsten, C. 275, P. 453
 tuning fork, P. 191
 turbine, P. 231
 turpentine, Gg. 63
 tympanic membrane, Bi. 579
 typhoid, Hy. 185, GS. 208, Bi. 293
 typhoon, Gg. 341
 tyranny, H. 431
 U., C. 468
 ulcer, Hy. 203
 ultimatum, H. 134
 ultra red, P. 305
 ultra violet, P. 306
 umbra, P. 307
 unabridged, Lt. 279
 unanimous, H. 189
 unconsciousness, Hy. 228
 unconstitutional, H. 297
 underweight, Hy. 14
 unemployment, H. 238
 ungulate, Bi. 345
 uniform, P. 77
 union, H. 50
 unit, Alg. 88, P. 527
 unity, Lt. 187
 univalent, C. 231
 unknown, Alg. 37
 unstable, C. 78, P. 78
 unstriped, Bi. 504
 uplands, Gg. 285
 upright, P. 308
 urban, H. 261
 urea, Bi. 617
 urine, Hy. 92, Bi. 618
 uterus, Hy. 315
 vaccination, Hy. 155, GS. 210, Bi. 320
 vaccine, Hy. 154, GS. 209, Bi. 319
 vacuole, GS. 186, Bi. 108
 vacuum, GS. 131, C. 187, P. 133
 vagina, Hy. 316
 valence, C. 232, P. 454
 valid, H. 298
 valley, Gg. 286
 value, Ar. 244
 valve, Hy. 119, GS. 132, P. 134, Bi. 523
 vapor, Gg. 342, GS. 114, C. 19, P. 232
 vaporize, C. 161, P. 233
 vapor pressure, P. 135
 variable, Alg. 38, P. 528
 variation, GS. 253, Bi. 692
 variety, Bi. 346
 vascular, Bi. 524
 vascular bundles, Bi. 237
 vaso-motor, Bi. 525
 vegetable mold, Bi. 667
 vegetables, Gg. 32, Bi. 666
 vegetarian, Bi. 347
 vegetation, Gg. 351, GS. 88
 vein, Hy. 86, Bi. 526
 velocity, P. 79
 venereal, Hy. 317
 venom, Bi. 471
 vent, Bi. 445
 ventilation, Hy. 271, GS. 115, C. 188,
 P. 234, Bi. 541
 ventral, Bi. 357
 ventricle, Hy. 120, Bi. 527
 verb, E. 12, L. 16
 verbose, Lt. 159
 verdict, H. 332
 vermin, Hy. 288, Bi. 446
 vernacular, Lt. 212

- versatile, Lt. 160
 verse form, Lt. 258
 versification, Lt. 257
 version, Lt. 280
 vertebra, Hy. 87, Bi. 505
 vertebrates, GS. 254, Bi. 348
 vertex, Gm. 55
 vertical, Gm. 37, Alg. 116, P. 529,
 Bi. 251
 vertices, Gm. 56
 vessel, Gg. 127
 vestigial, Bi. 693
 veteran, H. 406
 veto, H. 74
 vibration, P. 80, Bi. 70
 vice-president, H. 17
 vigorous, Lt. 161
 village, Gg. 166
 villain, Lt. 238
 villi, Bi. 608
 vineyard, Gg. 75
 violation, H. 317
 virtual image, P. 309
 virus, Hy. 156
 viscera, Bi. 609
 viscosity, P. 136
 viscous, C. 79
 visibility, P. 311
 visible, P. 310
 vision, Hy. 107, P. 312
 visual, Hy. 108
 vital capacity, Hy. 127
 vitality, Hy. 272, Bi. 321
 vitamins, Hy. 15, Bi. 631
 vitriol, C. 308
 vivid, Lt. 162
 vocabulary, E. 100, L. 95, Lt. 213
 volatile, GS. 116, C. 80, P. 137
 volcano, Gg. 287
 volt, GS. 165, P. 410
 voltage, P. 411
 voltaic, P. 412
 voltmeter, P. 413
 volume, Ar. 111, Alg. 89, Lt. 281,
 GS. 133, C. 520, P. 530
 voluminous, Lt. 163
 voluntary, Bi. 506
 volunteer, H. 407
 vomit, Hy. 34
 vote, H. 190
 vowel, E. 101, L. 96
 voyage, Gg. 128, H. 366
 vulcanize, C. 162
 vulgarism, Lt. 214

 warfare, H. 408
 wart, Bi. 275
 wasteland, Gg. 288
 waste products, GS. 187, Bi. 109
 watch glass, C. 499
 waterfall, Gg. 243

 water glass, C. 376
 water power, Gg. 244
 waterproof, Bi. 472
 water vapor, P. 235, Bi. 71
 waterway, Gg. 245, H. 244
 watt, GS. 166, P. 414
 wave length, P. 159
 wave motion, P. 160
 wave number, P. 161
 wealth, H. 211
 weather, Gg. 343, C. 163
 weathering, Gg. 352
 week, Ar. 88
 weevil, Bi. 447
 weigh, Ar. 112
 weight, Ar. 113, Alg. 90, GS. 143
 weld, C. 164
 welfare, H. 282
 west, Gg. 210
 whale, Gg. 10
 wharf, Gg. 129
 wheat, Gg. 33
 whimsical, Lt. 164
 whole number, Ar. 7
 wholesale, Ar. 165
 wholesome, Lt. 165
 whooping cough, Hy. 186
 wide, Ar. 114
 width, Ar. 115, Alg. 91, Gm. 142
 wiggler, Bi. 448
 winch, P. 81
 wine, Gg. 76
 witness, H. 333
 witty, Lt. 166
 wk., Ar. 180
 womb, Hy. 318
 wood fibre, Bi. 238
 wool, Gg. 87
 wordy, Lt. 167
 work, P. 82
 worth, Ar. 166
 wound, Hy. 204
 writ, H. 101
 wrought iron, C. 392

 X-axis, Alg. 52
 X-ray, Hy. 250, P. 415

 yd., Ar. 181
 yard, Ar. 62
 Y-axis, Alg. 53
 yr., Ar. 182
 year, Ar. 89
 yeast, Hy. 16, Bi. 276
 yield, Gg. 77
 yolk, Bi. 473

 zero, Ar. 8, Alg. 92
 zinc, C. 276, P. 455
 Zn., C. 469
 zone, Gg. 185

APPENDIX

OBJECTIVE TESTS FOR USE IN THE MASTERY OF ESSENTIAL
TECHNICAL VOCABULARY

A series of objective tests is being prepared covering the essential terms in five out of the thirteen school subjects for which lists have been presented.¹ The form of these tests varies according to the nature of the materials. Multiple-choice and pairing techniques are both used; in some cases, pupils are asked to pick out actual usages or illustrations. The questions require recognition or functional use whenever possible, rather than mere definition. Dictionary definitions, when used, have been simplified so as to avoid possibly unknown words. The tests for each subject may also be purchased separately.²

As to the use of these tests, the writer has a few suggestions, which may help the teacher to get the greatest possible benefit from them. It will be noted that each test is divided into several parts, each such part being an appropriate amount to be given at one time; *the parts are not duplicates*. From these tests the teacher should select whatever parts—or items within parts—deal with the vocabulary of the material she expects to teach during the first month or six weeks of school. Directions to the pupil for taking the tests are provided. However, the teacher should feel free to elaborate these directions or to use examples or illustrations. It is not necessary—as in the case of rigidly objective tests whose results are to be compared with norms—to use the directions verbatim. The main thing is that the pupils should understand what they are supposed to do.

The tests are “keyed” to the lists. That is, item number 58 tests the pupil’s knowledge of word number 58. If a pupil fails on items 6, 11, 12, 18, 27, and 32 of an arithmetic test, he has an inadequate grasp of concepts 6, 11, 12, 18, 27, and 32 in the list of terms for that subject. Sometimes an item tests the pupil’s knowledge of two words instead of one; in these instances, the item is preceded by two serial numbers—or else is preceded by one and followed by the other. This

¹ Tests in English composition and arithmetic are now published. In subsequent editions, similar tests in the high school subjects may be added.

² From the Public School Publishing Company, Bloomington, Ill.

double use of an item is due chiefly to a desire to economize on space. Since both serial numbers are given, the test results can be used just as easily as if only one word were tested on each item.

The entire list of special terms in the subject under consideration is printed on the cover pages of the pupil's test booklet for his use. After the teacher has scored a test section by making a mark against the serial number of each wrong item,³ she should hand the books back to the children and have each pupil mark on the vocabulary list the words having the same serial numbers as the wrong items. If an item testing two words is failed, both words should be marked. It is best to have the test books returned to the pupils, since some of the items need review study. When each child has entered his failures from his first test on the vocabulary list, he is ready for remedial work. His task consists in finding meanings for the words he missed. It is desirable to give an assignment on vocabulary, asking that each child remedy his deficiencies. The pupils should keep their test books in their desks or in some other available place.⁴

For some subjects the words have been so grouped that a test need be given only about once every six weeks, whenever a new section of subject-matter is taken up. Some of the vocabularies, such as history, did not lend themselves readily to such topical arrangement. Therefore, the entire test has to be given, a section at a time. The entry of errors onto the pupils' lists may be made whenever a section of the test is scored; remedial work may in the meantime be started on the words already tested. The testing in history—the longest list for which tests are at present provided—can be stretched out over an entire year, if desired, by giving one section of the test every month and then working on the errors shown. A teacher has to use her judgment as to when to use each section of the test in each subject. She has to work the testing in with her other assignments, and she should be careful not to give overdoses. On only one point should the procedure be absolutely invariable: *the teacher must make sure that the results of the testing are profitably used.* The task of remedial teaching is only started when each pupil has marked his list to show what terms he missed. The marked words present him with his next task in learning. He should be given adequate time for discovering the meanings. Words known by only a small proportion of the pupils should be discussed in class, in a way to develop clear concepts.

³ There is, of course, no reason why older children should not score each other's papers, under the teacher's supervision.

⁴ If desired, the teacher may have pupils needing much help make a list of the vocabulary numbers of the words missed, for the teacher's guidance in directing the study of each pupil.

When enough time has been given for remedial work,⁵ the teacher should repeat the test. The results of this second measurement should also be entered on each pupil's list. Words originally unknown but learned in the interim between tests should be crossed off. Words still unknown should receive a double circle. Words now missed for the first time should be added.⁶ If the teacher is dealing with a long list, she probably cannot do more than to test once for errors at the beginning of the course and again for mastery at the end. If the list is short—such as the English list—she can repeat the tests at intervals throughout the year until all the pupils have mastered all the terms. Tests, individualized lists, occasional assignments in vocabulary building, and a reasonable stressing of word meanings in class will work wonders. The whole thing is primarily a matter of educational engineering—that is, the arrangement of the learning situation so that each pupil knows what his deficiencies are and is faced with the task of remedying those, and no others.

If a teacher will once make use of the lists and tests in the manner above described, she will reap unexpected rewards in the general high level of work shown by her class. Her pupils will be able to read with real comprehension the texts or other books she assigns. The understanding of a paragraph is little if any better than the understanding of its least-understood words, just as a chain is no stronger than its weakest link. It has been the purpose of this entire, painstaking, laborious research in technical vocabulary to make possible the locating of these “weak links” so that the strength of the entire chain—in this case, the understanding of reading matter—may be strengthened.

⁵ In the course of time the writer expects to publish a dictionary for use in conjunction with the tests and lists.

⁶ There are always a few such words, since a pupil gets some items right by sheer luck.

Instructional Tests follow:

- (1) Fundamental Vocabulary of English Composition;
- (2) Fundamental Vocabulary of Arithmetic.

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INSTRUCTIONAL TESTS IN THE FUNDAMENTAL VOCABULARY OF ENGLISH COMPOSITION

By
LUELLE COLE

Pupil's Score

Part 1.....
Part 2.....
Part 3.....
Part 4.....
Part 5.....
Part 6.....
Part 7.....
TOTAL.....

Name..... Age (In September).....

Teacher..... School.....

School Year..... City..... State.....

PART 1

Directions: Just below there is a list of words with a number before each. Below this list is another, with parentheses in front of each word. You are to find, in the second list, examples of the terms appearing in the first. For instance, the first word is "adjective." Look through the second list of words until you have found two adjectives. Then put the number "1" in the parentheses in front of each of these examples. There are also two adverbs, two common nouns, etc. Be sure to find both. In each group, there are two examples for each term, except the last two groups (numbered 26 and 27) for each of which there are six examples.

1. adjective
2. adverb
3. common noun

4. conjunction
7. personal pronoun
8. preposition

9. proper noun
10. relative pronoun
12. verb

- () to
() house
() his
() France
() adequately
() fence

- () who
() because
() ran
() Edward
() with
() me

- () beautiful
() if
() bitter
() think
() poorly
() whose

14. infinitive
15. past participle

16. present participle
17. first person

18. second person
19. third person

- () we went
() to be
() he saw
() gone

- () you have failed
() wondering
() seen
() I am

- () to have thought
() you believe
() they shall not pass
() sleeping

20. future tense

21. past tense

22. present tense

- () we have learned
 () I shall scream
 () may I go?

- () it is raining
 () she will die
 () he was thinking

26. plural number (six examples)

27. singular number (six examples)

- () the girl
 () they
 () have gone
 () is here
 () I
 () the lilies

- () we
 () four children
 () a piano
 () has been
 () are coming
 () she

Part 1, Number Right.....

PART 2

Directions: Be sure to mark two sentences for each term. (See specific directions for Part 1.)

44. direct quotation

45. divided quotation

47. indirect quotation

- () He said he would not be gone long.
 () "I am here," she answered, "to help you."
 () I told him not to say that.
 () "I am very happy," she said.
 () He shouted, "Stay away from there!"
 () "And just when," I inquired, "did you decide?"

28. complete sentence

- () When the thunder rolls and the lightning flashes.
 () When will the strain be over?
 () My daughter was absent because of illness.
 () Before the last battle of the war, while we were still fighting, and the enemy seemed even more exhausted than we were.

29. complex sentence

30. compound sentence

34. simple sentence

- () The tall man is stronger than his brother.
 () He won because he tried hardest.
 () Will he be able to come if it rains?
 () She will go, but he will not.
 () The teacher opened the door, and the children ran out.
 () I will not believe it.

31. declarative
sentence32. exclamatory
sentence33. interrogatory
sentence

- () Who opened the door?
 () See them run!
 () I shall not be at home.
 () Those men will soon finish their work.
 () Let him try it!
 () Why is he going home so soon?

Directions: The examples of the three words below are to be found in the sentences. Thus, there are two "connectives," two "substantives," and two "gerunds." There are, however, 21 parentheses. From these you will need to select only 6 for the examples; the other 15 you are to leave empty. In each of the other similar illustrations, there will be many more spaces than you need to use. Each term is illustrated only twice, so do not put numbers in more spaces than necessary.

5. connective

11. substantive

13. gerund

The artist remained there, but his striving was in vain.

() () () () () () () () () () () () () () ()

Her leaving was unexpected because the pupils loved her so much.

() () () () () () () () () () () () () () ()

23. nominative case

24. objective case

25. possessive case

If she comes, pay her for her work.

() () () () () () () () () () () () () () ()

He saw them at their request.

() () () () () () () () () () () () () () ()

Part 2, Number Right.....

PART 3

Directions: Each term is illustrated only twice, so do not put numbers in more spaces than necessary. The parentheses refer to the part of the sentence between the vertical lines.

53. predicate

55. subject

He and his two brothers | set fire to the barn. |

() () () () () () () () () () () () () () ()

The other boy | was punished severely. |

() () () () () () () () () () () () () () ()

37. adverbial phrase

39. antecedent

43. direct object

I shall take | that story | with a grain of salt. |

() () () () () () () () () () () () () () ()

The boy | who was watching | with great curiosity, |

() () () () () () () () () () () () () () ()

recognized

your name.

The girl | went | because | she | was | lonely. |

() () () () () () () () () () () () () () ()

40. appositive

Watching him	he felt	the intense gaze	of the coach,
()	()	()	()
Frank Jones.	Trying hard,	he and his friend,	Joe Price,
()	()	()	()
hoped for	the coach's approval.		
()	()		

42. dangling participle

48. main clause

If you will lend me your coat,	I will go for help	in my car.
()	()	()
The class will please pass out now	to the assembly hall,	
()	()	
because it is time for the lecture.		
()		

52. phrase

56. subordinate clause

46. indirect object

I	told	him	the story,	having met	him	on the street.
()	()	()	()	()	()	()
After considering	the matter	the committee	gave	me	the prize.	
()	()	()	()	()	()	

51. participial phrase

Part 3, Number Right.....

PART 4

Directions: Below is a list of terms; below the terms are some definitions. You are to write the number before each term into the parentheses before the proper definition. There are more definitions than terms, so you will always have some left over.

57. composition

66. paragraph

60. editorial

67. resumé

64. narrative

73. title

- () an article published as the views of an editor
 () a name given to a general summary of the main points.
 () writing that is always imaginative
 () the name of a story
 () a division within a story, to indicate a change of topic
 () a story that tells the course of events
 () a particularly long essay
 () any type of story
 () a literary product showing study and care in arrangement

58. description

62. exposition

65. outline

59. dictation

63. narration

70. summary

- () a statement of fact
 () an explanation of some topic
 () work that is written down word-for-word as it is read aloud

- () a particular kind of style
- () a written condensation of a selection
- () an organized skeleton of the main points of a selection
- () a logical division within a long selection
- () writing that tells a story
- () writing that tells how someone or something looked
- () a type of letter

- | | |
|-----------------|--------------|
| 61. essay | 71. synopsis |
| 68. review | 72. theme |
| 69. rough draft | 74. topic |

- () a subject about which a composition is written
- () a report of a book, either written or oral
- () a division within a composition
- () a column in a newspaper
- () a list of main points
- () another word for "composition"
- () an adventure story
- () the first writing of a composition
- () a short exposition expressing the writer's point of view of some topic

- | | |
|--------------------|---------------------|
| 79. correspondence | 82. friendly letter |
| 80. envelope | 85. invitation |
| 81. formal letter | 87. note |

- () an informal letter to someone you know well
- () all kinds of letters
- () an uninteresting letter
- () a very short letter
- () a letter containing a protest
- () a letter asking someone to a party
- () the covering for a letter
- () a letter in which a book is ordered from a bookstore
- () a letter written in careful style to a person not well known to the writer

Part 4, Number Right.....

PART 5

Directions: Below is a list of terms. Under the terms is a list of examples illustrating them. There are two illustrations for each example. There are more items in the example list than in the list of terms, so you will have several left over. Write the number of each term in the space before the appropriate examples.

- | | |
|------------------|------------|
| 90. abbreviation | 97. prefix |
| 92. consonant | 98. suffix |
| 93. contraction | 101. vowel |

- | | | |
|-----------|-----------|----------|
| () un | () Dr. | () ly |
| () m | () pre | () r |
| () don't | () can't | () ment |
| () Mr. | () i | () a |

- | | |
|----------------|-----------------|
| 91. accent | 96. misspell |
| 94. definition | 99. syllable |
| 95. dictionary | 100. vocabulary |

- () the meaning of a word
 () the derivation of a word
 () the incorrect placing of letters within a word
 () a book containing words and their meanings
 () a word with neither suffix nor prefix
 () the total number of words a person knows
 () a unit of pronunciation within a word
 () the root of a word
 () the main stress within a word

- | | | |
|---------------------|--------------|------------------------|
| 111. capital letter | 112. italics | 114. punctuation marks |
|---------------------|--------------|------------------------|

- | | | |
|--------------|----------------------------|-------------------------------|
| () i. e. | () <i>in hoc signo</i> | () Paris |
| () don't | () ; | () ? |
| () Mary | () viz. | () <i>noblesse oblige</i> |

Directions: Below is a list of terms. Under the terms is a list of illustrations. There is *one* illustration for each term. You are to find it and put the correct number in the space before it. The numbers *after* the words are *not* to be used in the test.

- | | |
|------------------------------|----------------------------|
| 115. apostrophe (135) | 121. parenthesis (133) |
| 116. colon (126) | 122. period (128) |
| 117. comma (132) | 123. question mark (129) |
| 118. dash (134) | 124. quotation marks (130) |
| 119. exclamation point (131) | 125. semicolon (127) |
| 120. hyphen (136) | |

- | | | |
|----------|------------|------------|
| () ? | () ! | () ; |
| () , | () . | () ' |
| () : | () “ ” | () — |
| () - | | () () |

Part 5, Number Right.....

PART 6

Directions: Below is a list of terms, followed by a sample letter. Label the parts of the letter by writing the number of the correct term in the parentheses. There is only *one* example of each term.

- | | |
|-------------------------|----------------|
| 75. address | 83. heading |
| 76. body of letter | 88. salutation |
| 78. complimentary close | 89. signature |

1890 Arch Street
() Princeton, New Jersey
February 16, 1936

Mr. J. M. Brooks
() Craig Chemical Company
101 Madison Avenue
New York City

() My dear Mr. Brooks:

I have been informed that you have on the market a preparation
() called Dialine, for use as a local anaesthetic. Can you give me any information in regard to this matter?

() Yours very truly,
() Charles West, M.D.

Directions: After each question below there are four answers; you are to underline the correct one.

77. What type of letter is the one shown above?
friendly letter informal letter business letter personal letter
6. Which are "parts of speech"?
comma and semicolon noun and verb prefix and suffix
antecedent and appositive
35. Which type of sentence gives a direct expression of fact?
question fragment appositive statement

Part 6, Number Right.....

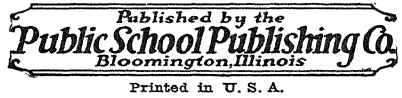
PART 7

Directions: After each question below there are four answers. You are to draw a line under the right one.

36. Where does one usually find a topic sentence?
at the end of a letter as a rule in a textbook
as the title of a story at the beginning of a paragraph

38. What is meant by the agreement of a subject with its verb?
 both are the same tense both are the same case
 both are the same gender both are the same number
41. What is the distinctive characteristic of a clause?
 it contains a modifier it is relatively long
 it contains an independent verb
 it expresses the entire thought of a sentence
49. In the sentence "The beautiful girl is here and has inspected the house,"
 which word is a modifier?
 beautiful here has girl
50. What does "modify" mean?
 to change position of a word in a sentence to use a different tense
 to derive a word from a foreign root
 to qualify the meaning of a word
54. What is meant by the phrase "sentence structure"?
 classification of sentences punctuation of sentences
 relation of words within a sentence correction of errors
- 84, 86. What is indented?
 an exclamation an idiom an indirect quotation a margin
- 102, 104. Which is a form of argumentation?
 a letter a predicate a debate an accent
103. What name is given to ordinary talk between two people?
 salutation derivation conversation pronunciation
105. What is a phrase sometimes called?
 an axiom an expression a riddle an abbreviation
106. Which sentence contains an idiom?
 () How do you do?
 () She was very beautiful.
 () The sun rose at six o'clock.
 () Who will go with me?
- 107, 110. What is another word for language?
 accent literature sentence speech
108. What is the pronunciation of a word?
 its definition its sound its spelling its vowels
109. Which is slang?
 I ain't been there Go roll your hoop Bring them books
113. What is the main purpose of punctuation?
 to emphasize important points to eliminate details
 to provide an outline to make reading easier

Part 7, Number Right.....



**INSTRUCTIONAL TESTS IN THE
FUNDAMENTAL VOCABULARY OF ARITHMETIC**

For Use in Grades 3-8

By

LUELLA COLE

Name.....Age (In September).....

Teacher.....School.....

School year..... City..... State.....

Pupil's Record					
Section	Date	Number Right	Section	Date	Number Right
1			6		
2			7		
3			8		
4			9		
5			10		

SECTION 1

Directions: After each of these questions, there are five answers. You are to draw a line under the one you think is right.

- Which is an amount? a piano that is bought but not paid for
a dog and a cat a sum of money a suit of clothes
a receipted bill
- If you said each set of numbers below out loud, which would be counting?
2-7-3-1 2-0-5-0 8-5-1-0 1-2-3-4 10-15-16-18

3. Which two numbers are equal to 8?
 $\frac{1}{2}$ and $\frac{1}{4}$ 2 and 2 12 and 8 7 and 0 5 and 3
4. Which is a number? 7 W ans. % @
5. Which is a Roman numeral? 101 A.B. pi .0006 XI
6. Which is the square root of 16? 8 3 2 6 4
7. Which is a whole number? $1\frac{7}{12}$.70 18. $\frac{1}{4}$ 10%
8. Which is the zero? 4. 0. .1 -.2 1.
21. Which problem contains a plus?
 $6 - 2 = 4$ $6 + 2 = 8$ $6 \times 2 = 12$ $6 \div 2 = 3$ $6 \times 1 = 6$
26. How does a sign help you? it shows you where your mistakes are
 it tells what the answer is it checks the answer
 it helps you add it tells you what to do
32. Which is a total? any large number a fraction the final sum
 the difference between two numbers a mistake in adding
35. Which of the following is a common fraction?
 10 3% $\frac{1}{3}$.01 $2 \times 5 =$
37. Which two numbers of the following are factors of 12?
 2 9 8 3 6
40. For which problem may you invert? $\frac{1}{2} + \frac{1}{3} =$ $\frac{1}{2} - \frac{1}{3} =$
 $\frac{1}{2} \times \frac{1}{3} =$ $\frac{1}{2} \div \frac{1}{3} =$ $\frac{1}{2} + \frac{1}{3} - \frac{1}{4} =$
53. Which of the following contains a decimal point?
 2:10 3.1416 4 ft. 3 in. 54% $\frac{4}{5}$
109. Which tells how fast you run? your age your size
 your capacity your speed your altitude
113. How do you express your own weight? in ounces in inches
 in feet in pounds in cubic inches
128. How do you measure an angle? in degrees in inches
 in square inches in length in hundredths

SECTION 1, Number Right.....

SECTION 2

Directions: Look at the problems below; then write the answers to the questions about them.

$$\begin{array}{r} (A) \\ 456 \\ 203 \\ \hline 179 \\ 838 \end{array}$$

$$\begin{array}{r} (B) \\ 42 \\ \times 21 \\ \hline 42 \\ 84 \\ \hline 882 \end{array}$$

$$\begin{array}{r} (C) \\ 43 \\ - 29 \\ \hline 14 \end{array}$$

$$\begin{array}{r} (D) \\ 22^{\circ} \div 31 \\ \hline 31 \overline{) 684} \\ \underline{62} \\ 64 \\ \underline{62} \\ 2 \end{array}$$

- 9, 10. Which is a problem in addition?
(Write A, B, C, or D).....
- 11, 29. What is the answer to the first problem called?.....
12. In which do you have to borrow?.....
13. In which do you have to carry?.....
14. What other numbers in (A) are in the same column with 4?.....
15. Which number is called a difference?.....
- 16, 17. Which is a problem in division?.....
18. Which problem contains a minus?.....
- 19, 20. Which is a problem in multiplication?.....
22. Which problem has a product?.....
23. Which number is the quotient?.....
24. Which is a remainder?.....
25. In the first problem what other numbers are in the same row with 9?
.....
- 27, 28. Which is a problem in subtraction?.....
29. Which number is the sum?.....
30. Which sign means to take away?.....
31. Which sign means times?.....

SECTION 2, Number Right.....

SECTION 3

Directions: Look at the fractions below; then answer the questions about them by writing the answers.

(A) $\frac{1}{2}$ (B) $\frac{2}{3}$ (C) $\frac{6}{5}$ (D) $3\frac{1}{2}$ (E) $\frac{1}{5}$

33. If you were going to multiply $\frac{1}{2}$ by $\frac{2}{3}$ what number would you cancel?
.....
34. If you were going to add $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{6}$ what common denominator would you use?
36. In (B) above, which is the denominator?.....
39. Which is an improper fraction?.....
41. Which is a mixed number?.....
42. In (A) above which is the numerator?.....
43. Which of the following fractions would you reduce?
 $\frac{1}{2}$ $2\frac{2}{3}$ $\frac{12}{16}$ $3\frac{9}{41}$
44. In (E) above what are the terms?.....

Directions: Study the examples below. Then answer the questions about them by writing the letter and the answer as (F) .1—(G) .01.

(A) $\frac{1}{2}$ (B) $\frac{2}{3}$ (C) $\frac{4}{5}$ (D) $\frac{1}{4}$ (E) $\frac{5}{7}$ (F) .1 (G) .01
(H) $\frac{1}{10}$ (I) $\frac{1}{100}$

45. Which fraction above shows fifths?.....
46. Which fraction above shows fourths?.....
47. Which fraction shows a half?.....
48. Which two fractions show a hundredth?.....
49. Which fraction shows a quarter?.....
50. Which two fractions show a tenth?.....
51. Which fraction shows thirds?.....
52. Which are decimal fractions?.....

SECTION 3, Number Right.....

SECTION 4

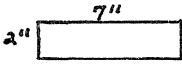
Directions: Just below there is a list of words with a number in front of each. Below the list, there are some explanations. Each word is explained, or defined. You are to find the definition for each word. For example: the first word is "ounce." Look through the explanations until you find the one that tells to what an ounce is equal. Then write the number in front of "ounce" (54) in the space just before the explanation you have selected. Match the other words in the same way.

- | | | | |
|--|-----------------|---|----------------|
| 54. ounce | 56. ton | 58. foot | 60. mile |
| 55. pound | 57. feet | 59. inch | 61. rod |
| () equals 5,280 feet | | () means more than 1 foot | |
| () equals 2000 pounds | | () equals $\frac{1}{16}$ of a pound | |
| () equals $\frac{1}{12}$ of a foot | | () equals $5\frac{1}{2}$ yards | |
| () equals 16 ounces | | () equals 12 inches | |
| 62. yard | 64. square inch | 66. square yard | 68. cubic foot |
| 63. acre | 65. square foot | 67. square mile | 69. cubic inch |
| () equals the space contained in a cube an inch long on each side | | () equals a space a mile long on each side | |
| () equals 3 feet | | () equals 1728 cubic inches | |
| () equals a space an inch long on each side | | () equals 144 square inches | |
| () equals 9 square feet | | () equals 4,840 square yards | |
| 70. bushel | 72. peck | 74. quart | 76. pair |
| 71. gallon | 73. pint | 75. dozen | |
| () equals 4 quarts | | () equals $\frac{1}{2}$ a quart | |
| () equals 2 gallons | | () means 12 of a kind | |
| () equals 2 pints | | () equals 4 pecks | |
| () means two of a kind | | | |
| 77. cent | 79. dollar | 82. century | 84. hour |
| 78. dime | 80. nickel | 83. day | 85. minute |
| () equals 60 minutes | | () equals 60 seconds | |
| () equals 5 cents | | () means 10 cents | |
| () means the same as a penny | | () equals 100 years | |
| () equals 100 cents | | () equals 24 hours | |
| 81. penny | 87. second | 89. year | 91. daily |
| 86. month | 88. week | 90. annually | 92. quarterly |
| () means once a day | | () means once a year | |
| () equals 7 days | | () equals a little over 4 weeks | |
| () means the same as cent | | () equals $\frac{1}{60}$ th of a minute | |
| () equals 12 months | | () means once every 3 months | |

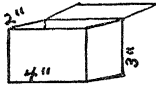
SECTION 4, Number Right.....

SECTION 5

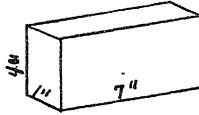
Directions: Look at the drawings below. Then answer the questions about them by writing the answers.



(A)



(B)



(C)



(D)

93. What is the breadth of (D)?.....
94. How broad is (B)?.....
95. What is the capacity of (B)?.....
96. How many square inches does (D) contain?.....
97. How deep is (B)?.....
98. What is the depth of (C)?.....
99. What are the dimensions of (A)?.....
101. What is the height of (B)?.....
102. How high is (C)?.....
103. What is the length of (A)?.....
104. How long is (D)?.....
107. Which object above has the largest total size?.....
108. How much space is there in (A)?.....
110. How thick is (C)?.....
111. What is the volume of (C)?.....
112. If A and D were cut from the same board, which would weigh more?
.....
114. How wide is (A)?.....
115. What is the width of (D)?.....

Directions: Read the problem below and then answer the questions by drawing a line under the right answer.

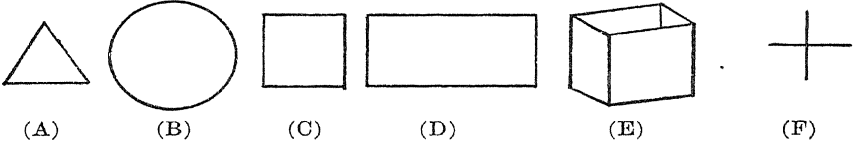
A man runs 10 blocks in 5 minutes. Each block is 100 yards long.
How fast does he run?

100. In the above problem what is the distance?
100 yards 5 blocks 1000 yards $1\frac{1}{2}$ miles 15 blocks
105. What is to be measured? the speed at which the man ran
the distance he ran the number of blocks the running time
106. What was his rate?
10 blocks 100 yards per minute 5 minutes 2 blocks a minute

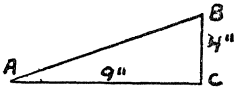
SECTION 5, Number Right.....

SECTION 6

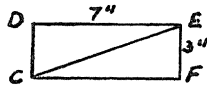
Directions: Look at the drawings below. Then answer the questions by writing the answers. You may use the abbreviations (A), (B), etc., to show which drawing you mean.



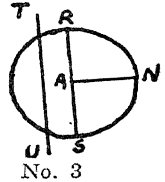
116. How many angles are there in (A)?.....
 117. Which is a circle?.....
 118. Which is not a figure?.....
 119. Which is a rectangle?.....
 120. Which is a solid?.....
 121. Which is a square?.....
 122. Which is a triangle?.....



No. 1



No. 2



No. 3

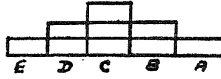
123. What is the altitude of No. 1?.....
 124. What is the area of No. 2?.....
 125. What is the base of No. 1?.....
 126. What letter is at the center of No. 3?.....
 127. Which figure has a circumference?.....
 129. Which line is diagonal?.....
 130. Which line is a diameter?.....
 131. Which line is a hypotenuse?.....
 132. What is the perimeter of No. 2?.....
 133. For which drawing do you need pi to get the area?.....
 134. How many points are marked in No. 2?.....
 135. What line is a radius but not part of a diameter?.....
 136. What is the longest side of No. 1?.....
 137. How large is the surface of No. 2?.....

Directions: Read the problem below and then answer the questions by drawing a line under the right answer.

Nine boys made the following scores in history:

E, D, D, C, C, C, B, B, and A

Their teacher made a drawing to show these marks:



138. What was the average mark? A B C D E
139. What is such a drawing called?
 a picture a graph a scale an answer a system
140. If the above figure were re-drawn only half as big as it is now, but if all the lines were kept the same relative size, what would the process of making such a figure be called?
 photography free-hand drawing lettering drawing to scale

SECTION 6, Number Right.....

SECTION 7

Directions: Just below there is a list of words with a number in front of each. Below the list, there are some explanations. Each word is explained, or defined. You are to find the definition for each word. For instance, the first word is "apiece." Look through the explanations until you find the one that tells what apiece means. Then write the number in front of "apiece" (141) in the space just before the explanation you have selected. Then match the other words in the same way. There are more explanations than words.

- | | | | |
|--------------|-------------|-------------|---------------------|
| 141. apiece | 143. bill | 145. cash | 147. charge account |
| 142. bargain | 144. budget | 146. change | 148. customer |
| | | | 149. discount |

- | | |
|--|--|
| () an estimate of what one expects to spend | () each one |
| () a percent of profit | () a man's total income |
| () a person who buys something | () actual money as compared with a check |
| () an arrangement by which a store allows a person to pay once a month for things bought during the month before | () something purchased at an unusually low price |
| () a reduction in the price of something | () small amounts of money, such as dimes and nickels |
| () a market list | () a statement of what a person owes someone else |
| | () an expense account |

- | | | | |
|---------------|-----------|-----------|------------|
| 150. exchange | 152. gain | 154. loss | 156. order |
| 151. expenses | 153. less | 155. net | 157. per |
| | | | 158. price |
-
- | | |
|---|--|
| () the cost of an article | () a man's salary after the taxes are subtracted |
| () a cancelled check | () the gain or loss after the expenses have been subtracted |
| () buying something for \$10 and selling it for \$8 | () buying something for \$5 and selling it for \$6 |
| () to bring back one dress and take another in its place | () the total money one paid out for a trip |
| () a request that an article be sent to a person, with the understanding that he will pay for it | () for each one |
| () the rate of interest | () an unpaid bill |
| () a company's debts | () minus |
-
- | | | | |
|---------------|--------------|------------|----------------|
| 159. profit | 161. receipt | 163. sale | 165. wholesale |
| 160. purchase | 162. retail | 164. trade | 166. worth |
-
- | | |
|--|---|
| () the value of an article | () a special time when things are sold cheaper than usual |
| () a large sum of money | () the handling of articles in large quantities |
| () the buying of an article | () a debt |
| () a signed statement that a debt has been paid | () the money made when something is sold for more than it cost |
| () a person's balance in the bank | () a percent of loss |
| () an income from insurance | () another word for "business" |
| () the buying or selling of articles in small numbers | |

SECTION 7, Number Right.....

SECTION 8

Directions: Below are some abbreviations. On the line after each, write out the word it stands for.

- | | |
|---------------|--------------|
| 167. bu..... | 175. oz..... |
| 168. doz..... | 176. pk..... |
| 169. ft..... | 177. pt..... |
| 170. gal..... | 178. qt..... |
| 171. hr..... | 179. sq..... |
| 172. in..... | 180. wk..... |
| 173. lb..... | 181. yd..... |
| 174. min..... | 182. yr..... |

Directions: Just below there is a list of signs; below the signs is a list of their meanings. Find the meaning of each sign and write its number in the space before the correct meaning. There are more meanings than there are signs.

183. +	186. ÷	189. "	192. \$
184. -	187. %	190. '	193. @
185. ×	188. =	191. °	194. ¢

() means "dollars"	() means "to factor"
() means "miles"	() means "to divide"
() means "to subtract"	() means "to add"
() means "percent"	() means "square root"
() means "angles"	() means "degrees"
() means "equal to"	() means "cents"
() means "inches"	() means "times"
() means "feet"	() means "at"

SECTION 8, Number Right.....

SECTION 9

Directions: Just below there is a list of words with a number in front of each. Below the list, there are some explanations. Each word is explained, or defined. You are to find the definition for each word. For instance, the first word is "balance." Look through the explanations until you find the one that tells what balance means. Then write the number in front of "balance" (195) in the space just before the explanation you have selected. Then match the other words in the same way. There will be some explanations left over.

195. balance	197. check	199. draw out	201. maker
196. bank	198. deposit	200. endorser	202. savings
() the person who writes a check	() money that is kept in a bank, but		
() a coupon from a bond	cannot be removed by check		
() an overdrawn account	() to put money into a bank		
() the amount of money one has	() a person who writes a bad check		
available in a bank	() to remove money from a bank		
() a written order to a bank to	() a place where money is kept		
pay out a sum of money	() to give money to charity		
() the person to whom a check is			
transferred			

- | | | | |
|------------|----------------|---------------|-------------|
| 203. bonds | 205. broker | 207. business | 212. coupon |
| 204. bonus | 206. brokerage | 208. capital | 214. debt |
-
- | | |
|---|--|
| () a person who buys or sells
stocks and bonds | () money used for investment |
| () an extra sum sometimes given
employees or investors | () a personal check |
| () a form of insurance | () any store that buys and sells
things |
| () a small ticket cut off a bond
and cashed to obtain the in-
terest | () a security that is selling below
par |
| () a form of investment | () the amount a broker charges for
buying bonds for another person |
| | () money that is owed |
-
- | | | | |
|-----------------|---------------|-----------------|--------------|
| 209. commission | 213. credit | 216. due | 219. finance |
| 210. company | 215. dividend | 218. face value | 220. funds |
-
- | | |
|--|---|
| () amount stated on a bond | () affairs involving money |
| () profit paid to holders of stocks | () said of a debt when the time
comes to pay it |
| () a promissory note that has not
been paid | () a percentage paid to salesmen
for bringing business to their
firm |
| () a business concern | () said of a concern that is bank-
rupt |
| () real estate | () money that can be drawn upon
at a given time |
| () an insurance policy | |
| () what one must have in order
to borrow money | |

SECTION 9, Number Right.....

SECTION 10

Directions: Just below there is a list of words with a number in front of each. Below the list, there are some explanations. Each word is explained, or defined. You are to find the definition for each word. There will be some explanations left over.

- | | | | |
|------------------|-----------------|------------|---------------|
| 211. corporation | 222. insurance | 225. issue | 227. market |
| 217. earnings | 224. investment | 226. loan | 228. maturity |
-
- | | |
|--|---|
| () a percentage paid by the bor-
rower to a bank | () money put into stocks or bonds |
| () an arrangement by which a
company agrees to pay a given
amount in case of accident or
death of a given person | () the number of stocks or bonds
put on sale at any one time |
| () money obtained by work or as
a return on investments | () a place where things are sold |
| () a very large business concern | () a sum of money borrowed from
another person |
| () time when a bond or note must
be paid | () the rate of interest |
| | () a promise by the government to
pay a certain amount at a certain
time |

- | | | | |
|---------------|---------------|----------|--------------|
| 221. income | 229. mortgage | 231. owe | 233. payment |
| 223. interest | 230. note | 232. par | 234. percent |
| | | | 235. policy |
-
- | | |
|--|---|
| () money kept in a savings bank | () transference of property as security for a debt |
| () a written promise to pay by a certain time | () time at which a bond matures |
| () amount paid for the use of money by the person to whom the money is loaned | () a loss due to a lessening in the value of money |
| () a proportion expressed in hundredths | () to be in debt to another person |
| () receipts from one's business | () an amount paid at any one time |
| () face value | () an agreement with an insurance company |
-
- | | | | |
|----------------|---------------|---------------|------------------|
| 236. premium | 238. property | 240. security | 242. speculation |
| 237. principal | 239. rate | 241. share | 243. stock |
| | | | 244. value |
-
- | | |
|--|--|
| () the sum of money actually loaned | () something of value deposited by a borrower, to be paid over to the loaner in case the debt is not paid |
| () a form of mortgage that carries high interest | () the total amount of one's income from all sources |
| () a coupon cut from a bond | () yearly amount paid on an insurance policy |
| () a type of investment that gives the buyer a proportional share in a company's profit | () an investment that may pay either a high return or a considerable loss |
| () the percent at which interest is to be paid | () one of the equal amounts into which a company's stocks are divided |
| () something that is owned | |
| () the worth of any object | |

SECTION 10, Number Right.....

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